FATA INSTITUTIONAL STRENGTHENING PROJECT (FISP)

SOUTH WAZIRISTAN AGENCY DEVELOPMENT PLAN

– FINAL REPORT

FEBRUARY 2013

ISSUANCE DATE: 14TH FEBRUARY 2013

COR: Muhammad Anwar **Development Objective:** (2) Governing Justly and Democratically

Prepared by Abacus Consulting under Contract # AID-391-C-11-00003

The FATA Institutional Strengthening Project (FISP) is made possible by the support of the American people through the United States Agency for International Development (USAID). The FISP is being implemented through Abacus Consulting.

Table of Contents

GLOSSARY

WATER SECTOR

Barani: Rain water
Drip irrigation: It involves dripping water onto the soil at very low rates (2-20 litres/hour) from a system of small diameter plastic pipes fitted with outlets called emitters or drippers
Fertigation: Application of fertilizers, soil amendments, or other water soluble products through an irrigation system
Furrow irrigation: Irrigation of farmland by water run in furrows between the crop rows
Iso-hyetal map: Map showing contour lines of equal rainfall depth recorded over a particular period of time
Kareze: A system of irrigation by underground tunnels
Sediment: Particulate matter that can be transported by fluid flow and which eventually is deposited as a layer of solid particles on the bed or bottom of a body of water or other liquid
Sprinkler irrigation: Irrigation water is applied to all field by means of rotating sprinklers or mini-sprinklers connected to a pressurized pipe system
Watershed: An area or ridge of land that separates waters flowing to different rivers, basins, or seas.
Spate irrigation: Spate irrigation is a type of water management unique to arid regions bordering highlands.
Stock water: Watered stock is an asset with an artificially-inflated value.
Stream Gauging Station: A location used by hydrologists or environmental scientists to monitor and test terrestrial bodies of water

AGRICULTURE

Agro forestry: Land-use system in which woody perennials are grown for wood production with agricultural crops, with or without animal production
Arable: Suitable for cultivation or tillable
Fodder: Coarse grasses such as corn and sorghum harvested with the seed and leaves green or alive, then cured and fed in their entirety as forage
Food Security: Food security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life
Grazing: Consumption of native forage from rangelands or pastures by livestock or wildlife
Horticulture: Branch of agriculture concerned with the cultivation of garden plants — generally fruits, vegetables, flowers, and ornamentals such as plants used for landscaping
Legume: A legume is a flowering plant that bears its protein-rich seeds in pods and can fix nitrogen from the soil (due to the symbiotic root bacteria rhizobia). Some legumes include lentils, beans, clover, alfalfa, vetches, kudzu, peas, etc.
Minimum Tillage: Involves: minimal soil manipulation in combination with chemicals for adequate seedbed preparation and vegetation control; and, minimal soil manipulation in combination with chemicals and residue incorporation for minimum moisture loss, reducing energy input and labor requirement.
Pasture: A type of grazing management unit enclosed and separated from other areas by fencing or other barriers and devoted to the production of forage for harvest primarily by grazing
Quality Control: The use of any device, technique, method, or person that makes possible the production, on time and at the lowest cost, of products of the quality necessary to gain full customer acceptance
Ram: A male sheep that has not been castrated

Residue: Forage remaining on the land as a consequence of harvest
Shamilat: common lands, or, a customary system of collective land ownership
Yield: Aggregate of products resulting from the growth or cultivation of a crop and usually expressed in quantity per area

TRADE

Bazaar: Name for Market in Urdu meaning a permanent merchandising area, marketplace, or street of shops where goods and services are exchanged or sold
Black Top roads: Roads with proper asphalt and bitumen covering/ topping
Dirt Tracks: Transportation routes with improper roads, passages, and bridges
Farm to Market roads: Roads connecting agricultural areas to main roads
Mine to Market roads: Roads connecting mining areas to main roads
Shingle roads: Roads without bitumen and asphalt topping
Truckloads: Load or amount that can fill or could fill a truck
Weighbridge: Platform scale flush with a roadway for weighing vehicles and cattle etc.

POWER

Biogas: Gas produced by the breakdown of organic matter in the absence of oxygen
Dispatch: The physical inclusion of a generator's output onto the transmission grid by an authorized scheduling utility
Grid: Layout of the electrical transmission system; a network of transmission lines and the associated substations and other equipment required to move power
Kilovolt (kV): Electrical potential equal to 1,000 volts
Kilowatt (kW): A unit to measure the rate at which electric power is being consumed- One kilowatt equals 1,000 watts
Kilowatt-hour (kWh): The basic unit for pricing electric energy; equal to 1 kilowatt of power supplied continuously for one hour
Line Losses: Power lost in the course of transmitting and distributing electricity
Load Shedding: The process of deliberately removing (either manually or automatically) pre-selected demands from a power system, in response to an abnormal condition (such as very high load), to maintain the integrity of the system
Load: The amount of power demanded by consumers- It is synonymous with demand
Megawatt (MW): One megawatt equals 1 million watts or 1,000 kilowatts
Network: A system of transmission or distribution lines cross-connected to permit multiple supplies to enter the system
Reliability: Term used to describe a utility's ability to deliver an uninterrupted stream of energy to its customers and how well the utility's system can handle an unexpected shock that may affect generation, transmission or distribution service
Solar PV: Solar panel electricity systems, also known as solar photovoltaics (PV), capture the sun's energy using photovoltaic cells. The cells convert the sunlight into electricity, which can be used to run household appliances and lighting.
Transmission: The process of transporting wholesale electric energy at high voltages from a supply source to utilities
Turbines: rotary mechanical device that extracts energy from a fluid flow and converts it into useful work
Volt: The unit of electromotive force or electric pressure which, if steadily applied to a circuit having a resistance of 1 ohm, would produce a current of one ampere
Watt: The electrical unit of real power or rate of doing work, equivalent to 1 ampere flowing against an electrical pressure of 1 volt

Mineral Sector

Andesite: It is an extrusive igneous, volcanic rock, of intermediate composition, with aphanitic to porphyritic texture
Basalt: It is an extrusive igneous rock. It is the bedrock of the ocean floor and also occurs on land in extensive lava flows
Corrosion: the degradation of a material due to a reaction with its environment
Denudation: long-term sum of processes that cause the wearing away of the earth's surface leading to a reduction in elevation and relief of landforms and landscapes
Dimension stones: Dimension stone is natural stone or rock that has been selected and fabricated (i.e., trimmed, cut, drilled, ground, or other) to specific sizes or shapes
Gabbroic: A dark granular igneous rock
Geothermal gradient: Geothermal gradient is the rate of increasing temperature with respect to increasing depth in the Earth's interior
Igneous: Igneous rock is formed through the cooling and solidification of magma or lava
Mesozoic: Interval of geological time from about 250 million years ago to about 65 million years ago
Ophiolite: Ophiolites are pieces of oceanic plate that have been thrusted (obducted) onto the edge of continental plates
Piedmont: landform created at the foot of a mountain.
Surpentinite: A major metamorphic rock type from regional metamorphism

EXECUTIVE SUMMARY

This report contains the Agency Development Plan (ADP) for South Waziristan Agency (SWA) of Federally Administered Tribal Areas (FATA). The main focus of this ADP is to identify and develop viable investment options that will enhance economic growth potential across the agency. The ADP is geared towards developing investment options across five sectors, namely: water; agriculture; trade; minerals; and, power. Whilst designing the investment options special emphasis was given to those interventions that would help optimize USG's past and future investments in the agency. At a more basic level, the assessments and analysis provided here will help demystify the scale and scope of need within the agency so that more meaningful reforms and support can be contemplated.

A team of experts worked on developing detailed assessments and analysis that were then used to develop sector specific medium term and fully costed investment options. Key findings for each sector covered as part of the ADP are provided next.

WATER

SWA's mean annual rainfall is 350 mm and can shrink or increase by half in a dry or wet year. The agency's water balance suggests that the volume of rainfall received in an average year is around 2.5 billion m^3. The average runoff is 0.75 billion m3 which can increase to 1.25 billion m^3 in a wet year. Annual recharge in a wet year is 125 million m^3.

SWA's water consumption estimates indicate that groundwater abstractions have resulted in lowering of the water table, especially in Wana and Ladha administrative units. Recharge of groundwater can be enhanced through rainwater/snow harvesting and management of floodwater. Largest water resource available in SWA for future development is rainfall, runoff and floodwater.

Distribution networks of domestic water supply and irrigation schemes are isolated. Most of the existing water supply schemes are based upon groundwater. Distribution networks are managed by the Public Health Engineering Department (PHED). Some schemes have community collection points where water users collect water. Irrigation schemes are largely managed by the communities themselves. Monitoring of water resources is completely neglected and in instances where data is collected it is rarely used for planning.

All major development functions for water resources rest with FATA Development Authority (FDA). However, there is ambiguity when it comes to the operation and maintenance of schemes as a well-defined structure does not exist. There are merits of assigning this responsibility to communities but this will not happen automatically. Beneficiaries' institutions need to be strengthened through empowerment and capacity building and by linking them with private sector service operators.

Analysis conducted here assessed opportunities available for domestic water supply and sanitation as well as water for agriculture. Water for agriculture covered both irrigated and rainfed farming systems. In addition, opportunities associated with rain and snow harvesting and watershed management opportunities were also analyzed. Special attention was given to opportunities that optimized benefits associated with Gomal Zam and other small dams constructed in SWA.

Investment options for water sector amount to US$ 104.0 million and requirements for the three administrative units are US$ 29.0, 27.0 and 48.0 million for Ladha, Serwekai and Wana, respectively. Provided below is information for six key interventions proposed here:

- **Water Supply and Sanitation:** Early recovery and reconstruction of damaged schemes and development of a long-term strategy for water supply and sanitation
- **Minor Perennial Surface Irrigation Schemes:** Re-habilitation of damaged schemes; provision of services and input supplies to water users through linkages with private sector enterprises; construction of storage dams and ponds; and, furrow irrigation and planting on laser leveled beds.

- **Perennial Groundwater Irrigation Schemes:** Re-habilitation of damaged schemes; provision of services to water users through linkages with private sector enterprises; furrow irrigation and planting on beds; drip irrigation for fruit plants and creeper-type vegetables; sprinkler irrigation for field crops; and, provision of services from drip and/or sprinkler irrigation companies.
- **Spate Irrigation Schemes:** Re-habilitation of damaged schemes; provision of services and input supplies to water users through linkages with private sector enterprises; construction of small dams and ponds; furrow irrigation and planting on leveled beds; and, watershed and reservoir management in Gomal Zam dam.
- **Rainwater/Snow Harvesting and Watershed Management:** Rehabilitation of damaged fields, water ponds and reservoirs; provision of services and input supplies to water users through linkages with private sector enterprises; rainwater and snow harvesting and water storage; furrow-bed planting; watershed management to reduce erosion; and, plantation of multi-purpose trees, nut fruits and grasses.
- **Private Sector Development:** Provision of services to farmers for: laser leveling; drip and/or sprinkler irrigation; terracing and leveling; input supplies and marketing of produce; and, deciduous fruit and multipurpose forest tree nurseries.

Implementation of water sector interventions should be led by private sector (irrigation companies, machinery rental services, input supplies enterprises, local service operators, etc.) in collaboration with relevant public sector institutions (FDA, Departments of Irrigation, Agriculture, PHED and Local Government and Rural Development).

AGRICULTURE

Agriculture is the main livelihood of the people of FATA and over 90% of the population derives their livelihoods, directly or indirectly, from this sector. It serves as a lifeline for the people of FATA and a pillar of the tribal economy. Farming practices in SWA and other agencies of FATA are characterized by underutilization of land and prevalence of risk-averse behaviors such as the cultivation of low input crops.

Land utilization for cultivation in FATA is lower than the settled areas. Of the total area of 2.7 million hectares in FATA only eight percent is used for cultivation. SWA encompasses around 662,000 hectares, which is 24 percent of the total FATA area, making it the largest agency. Of this, only three percent of the area is cultivated and the remaining is uncultivated. The land holdings are small, fragmented and average two acres per household.

Soil and climatic conditions favor cereal crops production but agricultural productivity remains low. Main cereal crops grown in SWA are wheat and maize which are produced as grain and the crop residue is utilized as fodder for animal feed. Food grains produced only meet household food requirements for five to six months. For the reminder of the year the farmers buy grain by selling livestock or from off farm income. SWA accounts for 19% of FATA's maize production and the yield per hectare of this crop is comparatively higher than other agencies which indicates that climatically the area is suitable for further development. The average yield of wheat is less than the other agencies. The reasons for this could be lack of access to quality seeds, improved technology, etc.

Fruit & Vegetable Production is mainly concentrated in the administrative unit of Wana. There are farm households that are engaged in commercial level production of vegetables (tomatoes, potato and onion), fruits (apple, peach, plum and apricot) and nuts (pine nuts, walnuts and ground nuts). They sell these products in the main settled area markets e.g., Lahore, Peshawar, Rawalpindi, DI Khan, Bannu, etc. SWA is the leading area in FATA for fruit production. In 2009-10 a total of 70,043 tons of Kharif fruits were produced in SWA that represented 76% of the total production of FATA Kharif fruits. While crops are grown on a commercial scale in these areas the return to farmers is low because of: poor quality of inputs; weak market information and perishability of fruits; weak transportation; limited skills in post-harvest handling, etc.

Livestock sub sector directly contributes to the socio-economic conditions of households in SWA and around 90% of the farmers rear livestock. In livestock, goats and sheep are the dominant type followed by cows. These are mostly reared for milk and meat. According to the livestock census (2006) there were 1.4 million cattle in FATA of which 0.13 million were in SWA. However, these are pre conflict figures and the expectation now is that the figures for livestock in SWA would be significantly lower. Overall, productivity of livestock in SWA is low due to inferior breeds, diseases, weak nutrition and lack of fodder especially in winter. Poultry production (backyard poultry) is an old tradition in the tribal communities and most households keep a small number of poultry birds, ranging from six to ten for eggs and meat. Poultry farmers here face a number of issues related to: layer and broiler farm management; diseases; knowledge about good breeds; feed; and, marketing skills.

Investment options for agriculture sector amount to US$ 51.8 million and requirements for the three administrative units are US$ 17.2, 15.6 and 19.04 million for Ladha, Serwekai and Wana, respectively. Provided below is information for key interventions proposed here:

- **Sector-wide Interventions:** Farm Services Centers, Land reclamation and leveling, Producer Associations, Farmer's Field School, establishment of soil laboratory and Rehabilitation of Livestock Facilities
- **Cereal Crops:** Increasing Crop Productivity; improving seed production; and, establishment of seed farms.
- **Horticulture:** Establishment of fruit mother tree farm; fruit orchard & nursery; off season vegetable & commercial vegetables; value addition; post-harvest; food processing unit; solar tunnel dryers; roasting technology; and, pack house.
- **Livestock:** Nutrition improvement; poultry farms; animal breeding; vaccination & deworming; feed lot fattening; wool spinning and weaving enterprises; and, animal sheds.

Implementation of agriculture interventions can be led by NGOs, CSOs, farmers associations in coordination with the Agriculture and Livestock Departments of FATA Secretariat and the Pakistan Army. Those agriculture interventions should be given priority that leverage existing and planned USG supported investments in SWA. It is also proposed that the Agribusiness Project should consider implementing some of the proposed horticulture and livestock interventions.

TRADE

Trade is a major source of livelihood in the tribal areas after agriculture and livestock. Most of the trading activity in SWA relates to wholesaling/retailing and transportation of consumer goods, especially fruit and other agricultural products.

Markets serve as hubs of trading activity and offer linkages and support that are crucial for trade. Developing trade across the agency will be only possible by upgrading facilities offered at key trading centers. SWA has been in a state of war for almost a decade which has caused severe damage to its infrastructure. Majority of markets in Mehsud area (i.e., Ladha and Serwekai) and some in the Wazir area have been badly damaged and require reconstruction. It is envisaged that the proposed reconstruction activities will provide livelihood opportunities to the local communities, many of whom, are returning IDPs. The approach proposed here to upgrade markets includes reconstruction of damaged markets and strengthening of specialized markets.

- **Reconstruction of Markets.** Reconstructing damaged markets and strengthening existing markets will play a vital role in increasing trade across the agency. The proposed markets will have improved infrastructure and access to facilities, such as, power, sewerage system, water supply, storage space, parking space, weighbridges, etc. Main markets proposed for reconstruction here include: Makeen, Sararogha, and Chaghmalai markets in Ladha; Spinkai Raghzai, Barwand, Maula Khan Serai markets in Serewekai; and, the market at Jandola in FR Tank.

- **Specialized Markets.** The proposal here is to strengthen specialized fruits and vegetables markets at Wana and Azam Warsak. This will involve further developing existing fruit and

vegetable markets by improving their infrastructure and their access to facilities, such as, power, sewerage system, water supply, storage space, parking space, weighbridges, etc. These Specialized Markets will be linked with other markets of the country through an effective network and communication system.

There has been considerable investment in development of road infrastructure across SWA in the recent years. For instance, under FATA Infrastructure Program (FIP), USAID funded construction of roads from Kaur to Wana and Tank to Makin. Simultaneously, Government of UAE is also funding construction of a road that links Wana to Angoor Adda. Despite these investments, there exists opportunity to improve mine to market and farm to market roads that will facilitate development of trade across SWA.

- **Mine to Market Roads.** SWA is rich in mineral resource however activity in the extractive sector has, so far, been limited. The idea here is to develop access routes so as to facilitate the flow of minerals to the main transportation networks and markets. The proposed interventions here involve development of 44 kilometers of mine to market roads in different locations of Ladha and Serewekai administrative units.

- **Farm to Market Roads.** The agriculture produce of SWA is concentrated in the Wana administrative unit. Condition of roads providing intra village connectivity is not satisfactory and requires improvement in order to facilitate farmers' access to markets. The proposed interventions here involve construction of 117 kilometers of farm to market roads that will connect the main horticulture producing area of Wana to major roads and markets.

SWA has three main border-crossings into Afghanistan, these are at: Angoor Adda; Warsak; and, Khand. As discussed earlier, the soon to be completed Wana-Angoor Adda road will serve as a highway connecting SWA to Paktika province of Afghanistan. Currently, the Angoor Adda border-crossing does not have any custom facilities and development of such facilities will play a key role in encouraging trade via this route. The proposed intervention here is to establish a Custom Border Complex at the Angoor Adda border-crossing which will provide the following facilities: cargo examination and handling; secure premises; testing laboratory; multi-lane roads; etc.

Investment options for trade sector amount to US$ 92.1 million and represent a total of 19 interventions. Provided below is information for key interventions proposed here:

- Reconstruction of seven demolished markets
- Upgrade of two fruit and vegetable markets into specialized markets
- Construction and rehabilitation of 161 kilometers if mine to market and farm to market roads
- Establishment of a Custom Border Check point at Angoor Adda

Implementation of trade sector interventions could be carried out in coordination with partner organizations that have the technical capacity as well as presence in the agency. Local organizations' (such as, Works & Services Department, CSOs, etc.) ability to implement interventions is affected due to lack of: technical capacity; resources; and, access within the agency. In the medium term, a viable implementation approach would require a coordinated effort by a range of stakeholders. These efforts would need to be developed in close coordination between the Pakistan Army, political administration and the local community. It would be worthwhile to consider establishment of a forum with representation of these stakeholders that can oversee the design, development and implementation of trade related interventions.

POWER

Electrification of FATA started in 1960 and has gradually been extended to all agencies. Poor electricity service remains a key constraint for growth of economic and industrial activities across FATA. Electricity is provided at a subsidized flat rate to consumers without electric metering system.

Frequent power breakdowns, low voltage, heavy line losses remain as challenging issues for the power sector across SWA and FATA in general.

The Tribal Electric Supply Company (TESCO) is responsible for constructing, operating and maintaining power distribution facilities within FATA. Electricity supplied to FATA, including SWA, is through the National Grid. TESCO has an integrated secondary transmission system consisting of 132 kV, 66 kV and 33 KV transmission lines and grid stations for receiving the power from the primary transmission network. Currently, 1,511 villages of FATA, out of a total of 2,524 villages, can receive electricity.

According to Secretary TESCO, by December 2012, 416 SWA villages had access to electricity, which is considerably more than 2008-9, when the corresponding figure was 311 villages. At present, approximately 25 percent of the households in SWA have access to the national electricity grid. This is primarily due to the significant damage caused to the grid as a result of conflict. The level of electrification is most extensive in administrative unit of Ladha and consists of 11 kV and 33 kV distribution lines. This is followed by administrative unit of Serwekai which primarily contains 33 kV lines. Wana's power infrastructure has been seriously affected by the conflict and only has a single 33 kV line running through it.

No large-scale hydropower projects, apart from the Gomal Zam project, which is nearing completion, are currently under consideration in the agency. The favorable terrain existing in large parts of the agency needs to be utilized for development of hydropower generation units of various capacities. FDA has identified 13 sites for development of small irrigation dams in SWA. Technical assessments need to be conducted for these sites to explore the possibility of power generation. Also, a detailed strategy needs to be formulated that focuses on: identifying and developing community managed 'run of the river' micro hydel projects at all suitable locations across the three administrative units of the agency; utilizing any 'low head sites' for development of micro hydel stations; and, securing sufficient financial resources to undertake the required operation and maintenance of the plants.

Considering high solar irradiation levels in SWA coupled with replenishment of depleted livestock holdings in the post conflict era, utilization of renewable energy (RE) based technologies would prove a viable and sustainable option for electrification of remote off-grid rural communities. The proposal here is to deploy solar photovoltaic (PV) and biogas units across SWA as a means of providing reliable supply of electricity.

In the case of biogas, a possible approach for developing and implementing an effective program could involve leveraging existing livestock (preferably cows) and having village communities jointly manage and operate the biogas units. However, in areas where households are scattered, a 'jointly managed' biogas unit cannot be developed and instead, small-scale household biogas units can be contemplated. These smaller units can be similar to those already installed in Punjab.

Prior to the conflict, on average, 10 to 12 goats and sheep and 4 to 5 cows were reared per household in SWA. However, over the last few years, many households of SWA have lost their livestock holdings due to the conflict. In order to ensure the development of a sustainable rural electrification program in the future; 'livestock farms' must be established, thus guaranteeing a minimal quantity of manure as raw material for this technology.

High solar irradiation levels throughout the year (4.5 kWh/m^2/day on average) make solar energy generation a viable RE alternative. The government realizes this as well and FS has allocated 270.8 million PKR for providing PV to various villages in FATA. The approach for exploiting solar energy should: give priority to villages furthest from the grid; ensure that system is designed to cater to the needs of the communities; be mindful of lessons learnt from similar solar PV rural electrification projects in other parts of the country; and, establish a mechanism to generate financial resources for operation and maintenance of the system.

Investment options for power sector amount to US$ 65.0 million. Provided below is information for key interventions proposed here:

- Development of small scale/mini hydropower projects through detailed technical assessments for possibility of power generation from identified irrigation dam sites, 'low head' and 'run of river' sites.
- Installation of biogas applications for electricity generation through 'community managed' biogas units and utilization of biogas for heating and cooking in households.
- Installation of Solar PV for: lighting of households in remote 'off-grid' villages; pumping of water for irrigation and drinking; and, lighting of street lights & markets.

The possible partners for implementation of the recommendations of the ADP Power Sector could be key players in the power sector of Pakistan such as World Bank, European Union (EU), KfW (German Development Bank), JICA, UNDP & ADB with support on ground and mobilization of communities through CSOs, NGOs and FATA Secretariat/relevant Government authorities in SWA.

MINERALS

In the past, mineral exploration work has been carried out in SWA on a limited and intermittent basis. Sustained efforts for developing the mineral resource base of the agency were hampered by the non-cooperative attitude of the local communities. In the absence of proper geological information, unscientific sporadic extraction of different minerals (like copper, chromite and manganese) has been conducted informally by the locals. This has resulted in premature closure for a number of small mines and the destruction of any surface evidence of these minerals which would have played an important role in any future exploratory efforts. Moreover, the prevailing insurgency in the agency has mostly halted any mining activity due to non-availability of blasting material and fuel.

Restricted geological investigations of SWA reveal complex geological pattern with a wide spectrum of sedimentary, igneous and metamorphic rocks. Deposits in the agency include world-class dimension stones and a number of metallic minerals, such as, chromite, manganese, copper, gold, silver and rare earth minerals. Information on key minerals that are available in SWA is provided below:

- **Dimension Stones.** Over two billion tons of international grade granite and serpentinite deposits exist in the Agency. These deposits make it viable to establish a number of quarries that have modern block cutting technology (including application of chain saws, wire saws, excavators, loaders, pneumatic drill machines and hydro pushing plant etc.). Dimension stones are in great demand in international markets and there are sufficient deposits in SWA to meet long term market demand.

- **Chromite.** Chromite is the only source of chromium and it is used in metallurgical industries, chemicals and foundries. Chromite hosting rocks are distributed across the north-western part of the agency. Major chromite bearing areas include Mishta, Borakai and Mami khel. The chromium oxide (Cr_2O_3) content in the chromite ore ranges from 35-45%. Previously, 400 tons chromite was extracted from the Agency, but due to continuous insurgency and non-availability of blasting material, mining has been stopped since 2007

- **Manganese.** Manganese is a critical raw material for steel and ferrous foundry industries. The commercial appeal of manganese is derived mainly from its beneficial effect on iron and steel which includes: desulfurization; de-oxidation; and, the alloying effects of increased strength, toughness, hardness and hardenability. Manganese mostly occurs in the form of stringers, lenses, veins and pockets with various dimensions in the area. Manganese deposits are located along the northern and central parts of the agency across Ladha and Serwekai administrative units. The Manganese Dioxide (MnO_2) content is very high and can be used for manufacturing of Ferro-

manganese alloy. Prior to 2007, limited mining (around average annual production of 200 tons) was carried out in SWA. Since then, mining activities have been suspended due to the unrest.

- **Hydrocarbon Potential.** The eastern part of SWA comprises of thick sedimentary rock sequence. Geological studies for this area point towards a presence of a petroleum system i.e. source, seal and reservoir rocks. Recent discoveries of hydrocarbon in adjoining areas of Kohat and Suleman Basin and parts of Baluchistan also support the idea of existence oil & gas in the area. Given these encouraging geological indicators Oil & Gas Development Company Ltd has acquired exploration license for Wali Block (parts of SWA, FR-Tank and Bannu) and Saif Energy Ltd. has applied for an exploration license for Wali West (North Waziristan and SWA) and Baska North (SWA and parts of FR D.I. Khan). The Federal Government has initiated work on ways it can provide security to oil exploration companies that want to work in the field. It is envisaged that the first phase of geophysical exploration will be completed in about one year.

Investment options for mineral sector amount to US$ 10.4 million and represent five key interventions. These interventions are listed below:

- Installation of Block Cutting Machinery on Borakai-1 granite deposit.
- Installation of Block Cutting Machinery on Borakai-2 granite deposit.
- Establishment of Gravity Beneficiation plant for chromite.
- Establishment of ferromanganese manufacturing plant based on raw material from FATA
- Preparation Geological Base Map of South Waziristan Agency on scale 1:50,000

Implementation of mineral sector interventions could be carried out in coordination with partner organizations that have the technical capacity. These organizations can include public and private sector entities as well as academic institutions and business associations. As was the case with trade sector interventions, it would be useful to enter into a dialogue with the Pakistan Army to secure their assistance in gaining access to mineral deposits in hard to reach and conflict areas.

1-1 BACKGROUND

INTRODUCTION

This report contains the Agency Development Plan (ADP) for South Waziristan (SWA) of Federally Administered Tribal Areas (FATA). The main focus of the ADP is to highlight investment opportunities that will spur sustainable development through economic growth across the agency. The ADP will focus on developing a menu of investment options across five key sectors, namely: water; agriculture; trade; power; and, minerals.

This report begins with a high-level introduction to the existing demographic, geo-political and socio-economic circumstances across SWA. This is followed by five chapters each of which provides information, assessment and analysis for the five key sectors separately. Each sector specific chapter is organized in three sections:

- Section One provides an overview of the existing sector specific circumstances
- Section Two contains in-depth assessments of sub-sectors where opportunities for development exist
- Section Three builds upon the information and analysis provided in the preceding two chapters and delivers a set of fully-costed investment options

1-2 GEOGRAPHICAL INFORMATION

SWA is the largest of the tribal agencies and has an area of 6,619 square kilometers. The agency is nestled between North Waziristan (north), D.I. Khan (East), Balochistan (south) and Afghanistan (west). SWA shares with the Afghan province of Paktia a mountainous border of about 70 kilometers. The area consists of rugged rocky terrain with several peaks over 8,000 feet.

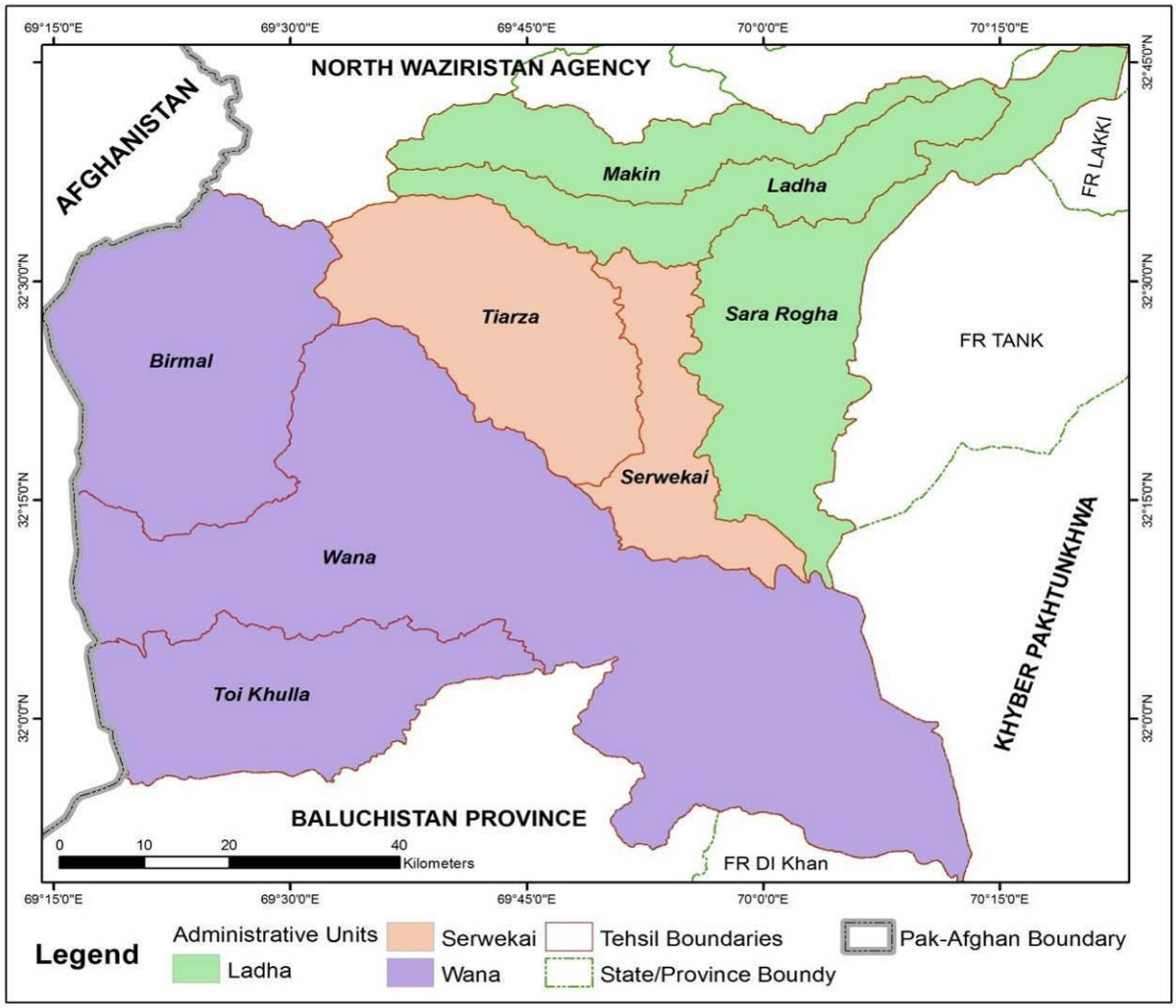
Arable land is in short supply, so narrow valleys are intensively farmed. The major river is the Gomal which lies on east-west axis. The Gomal river valley and pass constitute the oldest trade route in the area, moving from DI Khan, through SWA and Balochistan and then onto the Afghan plateau. Other rivers, such as the Shahur and Tank Zam flow through portions of the north eastern and eastern parts of the agency. The main plains (or valleys) are the Wana plain, the Zarmilan which lies northeast of Domandi, the Bermand, and the Spin. The Wana plain, at 8,476 acres, is the largest inter-mountain basin in the agency making it one of the largest in FATA.

1-2 ADMINISTRATIVE UNITS

The Agency is under the administration of the Political Agent. Its area is administratively divided into three administrative units, namely Wana, Ladha, and Serwekai. These administrative units are further subdivided into eight Tehsils and are shown in Figure 1-1. The agency headquarter is located in Wana.

The Governor of Khyber Pakhtunkhwa (KPK) is the chief executive for FATA and is an agent of the President of Pakistan. There are three administrative set-ups, namely, the Ministry of States and Frontier Regions (SAFRON), FATA Secretariat (FS), and FATA Development Authority (FDA) that support and run FATA under the direction of the Governor KPK. The agency is governed under the Frontier Crimes Regulation Act (FCR) of 1901.

FIGURE 1-1: ADMINISTRATIVE UNITS & TEHSILS OF SWA



Source: Information secured from USAID & Survey of Pakistan

1-3 SOCIO-ECONOMIC PROFILE

FATA is home to over 4 million people most of whom belong to different Pukhtoon or Pushtun tribes[1]. In general, FATA is the most economically backward area of Pakistan where an estimated 60% of the population lives below the poverty line[2]. From Table 1-1 (below) the population of SWA Agency was 429,841 in 1998 which accounted for 13.6% of FATA's overall population. In 2009, FS revised SWA's population figure to 530,000.

Table 1-1: POPULATION OF SWA AND FATA

Region	Area (Sq Km)	Population Census (1998)	Estimated population in 2008-09	Growth rate	Density (Persons per Sq Km)
SWA	6,620	429,841	530,000	1.95	65
FATA	27,220	3,176,331	4016495	2.19	117

Source: 1998 Census & FATA Secretariat

[1]FATA Secretariat

[2]Ibid

There are two major tribes in SWA, Wazirs and Mehsuds. Wazirs live in Wana subdivision, while Mehsuds occupy Serwekai and Ladha subdivisions. There are several other smaller tribes living in the agency like Bhittanis, Suleimankhail, etc.

EDUCATION

As shown in the Table 1-2 (below), literacy rates across all age groups are consistently lower than the literacy rate for FATA (21.4%). The participation rates for SWA also lag well behind the average for FATA for both genders. Participation rates in higher education for males and females was four and one percent, respectively.

Table 1-2: LITERACY RATE, PARTICIPATION RATE, AND DROPOUT RATE IN FATA AND SWA 2009

Rate (%)	SWA			FATA		
	Both Sexes	Male	Female	Both Sexes	Male	Female
Literacy Rate	20.30	31.90	5.50	21.40	33.80	7.50
Participation rate (Primary)	41	54	29	50	68	34
Participation rate (Middle)	17	25	7	34	53	13
Participation rate (High)	2	4	1	6	9	2

Source: FATA Development Statistics 2009

HEALTH

Health services are not easily accessed in FATA and more particularly in SWA. For instance, as provided in Table 1-3, there are only five hospitals for catering to the medical requirements of over half a million people that live in the agency. It is pertinent to mention here that many of these health facilities have been damaged and/or destroyed due to the conflict and those that remain operate as empty shells with no medicines and staff to provide services[3].

TABLE 1-3: HEALTH INSTITUTIONS AND THEIR BEDS STRENGTH IN FATA AND SWA AGENCY 2009

Area	Hospitals		Dispensaries		R.H Centres	T.B. Clinics	Basic Health Units	Sub Health Centre	M.C.H Centres	Leprosy Clinics
	No.	Beds	No.	Beds	No.	No.	No.	No.	No.	No.
FATA	32	1660	425	-	8	7	173	3	72	3
SWA	5	135	41	-	-	-	17	-	2	-

Source: FATA Development Statistics 2009

[3]Monitoring and Evaluation Services SWA – Social Sector Baseline Survey, USAID

LIVELIHOODS

Livelihood opportunities across SWA and FATA are limited. Local economy is mainly pastoral with agriculture practiced across a few valleys. Most households are involved in subsistence agriculture and livestock rearing or small-scale business conducted locally. Others are involved in trade either inter-agency or domestic. With very few industries operating in this area many seek employment as short-term unskilled workers or enlist in local security or paramilitary forces. Those who can travel relocate to other cities in Pakistan or the Middle East to seek employment. The more qualified and educated have, in most instances, relocated permanently with their families to urban centers outside of the tribal areas.

1-4 GOVERNANCE

The overall administrative and political control of FATA agencies fall under the Federal Ministry of States and Frontier Regions (SAFRON) which is answerable to the elected Prime Minister and National Assembly. Executive authority rests with the President and is exercised through the Provincial Governor.

Local administration in each agency is run by the Political Agent (PA) who is a Federal civil bureaucrat and performs several functions, such as, acts as: an executive; a judge; a revenue collector; and head of the Agency Council. The PA also oversees all development activity and line departments come under his jurisdiction. Furthermore, the PA is responsible for maintaining law and order through Khassadars/Levies[4] and Maliks or Lungi Holders[5].

The regulatory framework in place in FATA is based upon the Frontier Crimes Regulation (FCR). Under this system, the PA is the District Magistrate. Furthermore, the Political Parties Act of Pakistan has been extended to FATA and adult franchise system was introduced over the 1997 general elections[6]. As per the Constitution of Pakistan no act passed by the parliament is applicable to FATA. Also, the constitution protects fundamental rights of the citizens of Pakistan and same rights are extended to the FATA population. However, Supreme Court that guarantees these fundamental rights does not have jurisdiction in FATA.

1-5 IDPS OF SWA

Pakistan Army started military operation in SWA against Tehrik e Taliban (TTP) in 2009. The launch of this operation triggered a mass evacuation of people from the agency. Many of these internally displaced persons (IDP) were provided accommodation in government-run temporary camps established in D.I Khan and Tank districts while some of them took refuge with relatives and friends in different parts of the country. Repatriation of IDPs started in December 2010 and the process is still ongoing.

According to Fata Disaster Management Authority (FDMA), 25% percent of the 85,751 registered IDP families have returned to SWA. They also estimate that the number of unregistered IDPs is even greater than those that registered. Along with free transportation, each returning family is provided

[4]Khassadars or levies are a force appointed by the PA. Specific functions of the Khassadars are: protecting strategic roads and utilities; performing guard duties; export duty; protection of installations; and, acting as body guards.

[5] Malik or Lungi Holder is a representative of a tribe who is recognized by the government to have influence over their respective tribe. Maliks are hereditary whereas Lungi Holders are selected by the PA with the consent of the Governor of KPK. Both of these are paid allowances and subsidies to ensure their loyalty to the PA.

[6] Prior to the adult franchise system around 35,000 tribal Maliks and elders would vote and elect FATA representatives of the Lower House (National Assembly) as FATA comes under the Federal jurisdiction. A further eight seats are allocated in the Upper House (Senate) for FATA representatives as well. However, FATA does not have any representation in KPK's provincial assembly.

with six months ration and Rs. 25,000 in cash. Despite this, the IDPs are reluctant to return for the following reasons:[7]

- IDPs are afraid of being targeted by the TTP in their villages
- Limited livelihoods opportunities as local economy is in disrepair
- Difficult to live in the government issued tents through the harsh winter as many IDP dwellings have been damaged and/or are destroyed
- Some IDPs have decided to stay on and live in the settled areas

[7]This information was sourced from a USAID Survey conducted by Associates in Development (AID)

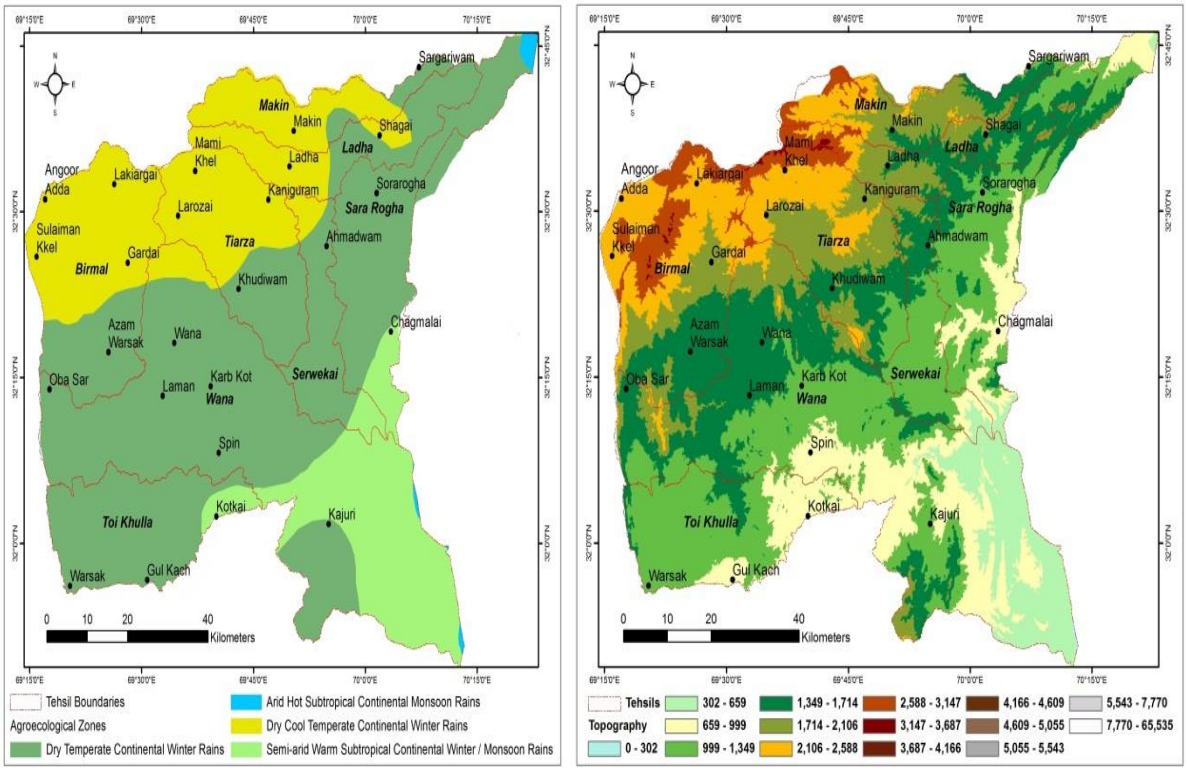
2 WATER
2-1 WATER SECTOR OVERVIEW

2-1-1 CURRENT STATUS

Ecology and Physiography

SWA has a geographical area of 6620 km^2 making it the largest agency of FATA. Major towns are interconnected with roads. FRs of D. I. Khan, Tank and Lakki are located adjacent to SWA. Its climate (Figure 2-1) is semi-arid, subtropical and continental highlands: a) Zone-I - dry temperate continental winter rains; b) Zone-II - dry cool temperate continental winter rains; c) Zone-III - arid hot subtropical continental monsoon rains; and d) Zone-IV - semi-arid warm subtropical and continental winter and monsoon rains (Figure 2-1). Peaks of mountains range from 1000 to 3700 m having slopes from west to south-east (Figure 2-2). Major plains are Spin and Wana. Nearly 23.6% area is plain while 76.4% is mountainous**.** SWA consists of series of mountain valleys and plains interspersed with numerous streams.

FIGURES 2-1 & 2-2: AGROECOLOGICAL ZONES OF SWA; AND, TOPOGRAPHY OF SWA



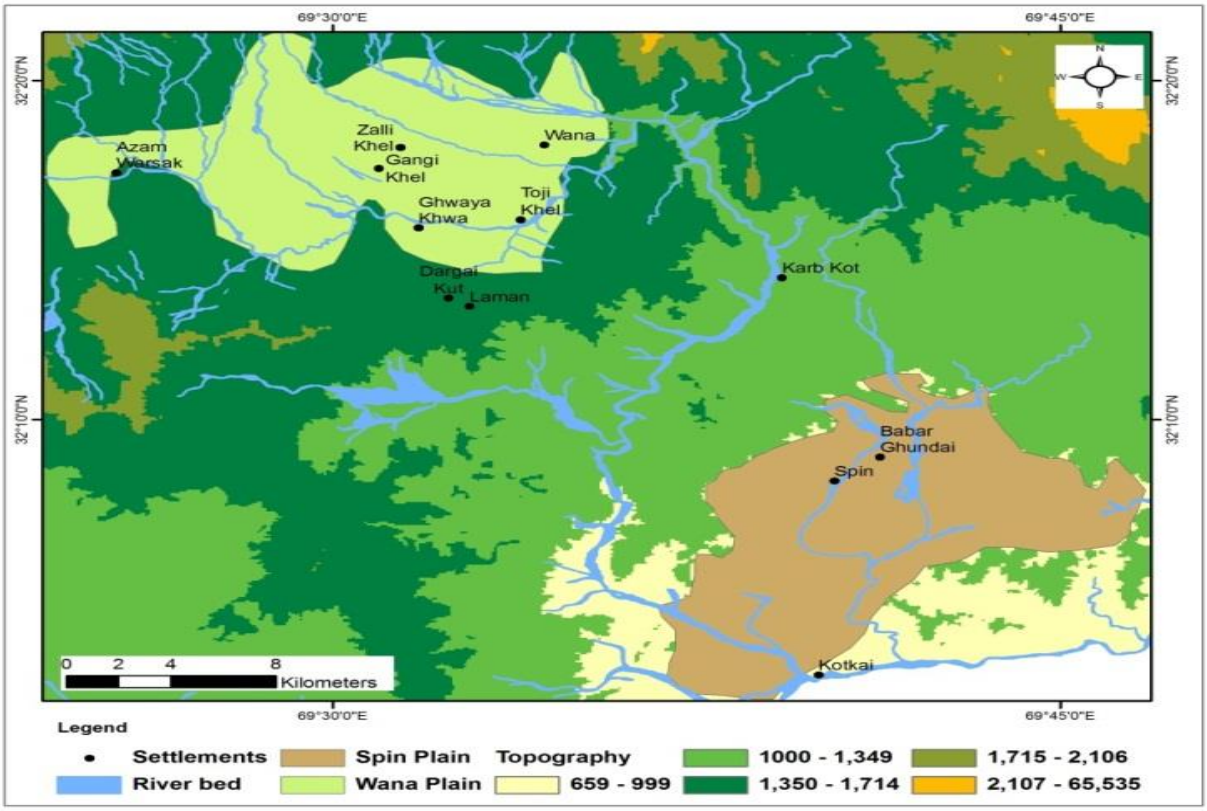
Source: Survey of Pakistan & Google Earth

Spin Plain

Spin Plain is the largest plain area, spread over 130 km^2 and inhabited by Ahmad Zai tribe. Its elevation varies from 873 to 947 m. It can be divided into three parts (Figure 2-3): area around Spin Kili; Star Nur and adjoining areas; and, plain areas in scattered patches. The plain area around Spin Kili is 10 km^2. It seems to have been formed by alluvial deposits. Spin Kili, Lakai and Babar Chundai are the main settlements. Star Nur and its adjoining plain area consist of 28 km^2. Two areas are

separated by a channel (Kaisara Algad) formed by confluence of a few local streams. Over 10 km^2 of the area is scattered with a number of small plain patches located between Spin Kili and Star Nur.

FIGURE 2-3: SPIN PLAIN AND WANA PLAIN



Source: Survey of Pakistan & Google Earth

Wana Plain

The Wana Plain bounded by mountains extends on all sides of Wana Town and has an area of 120 km^2. Most of the area lies between elevations 1,370 to 1,525 m. It comprises Dargai Kut, Ghawai Khwa, Zalhkel, Togikel and Ganjikel areas (Figure 2-3). Most of the area lies between the left bank of Wana Toi to the right bank of Wacha Khawar. The area on the left bank of Wacha Khawar is interspersed by a number of hill-torrents. Lowest ground elevation is 1,370 m around which the ground level increases on both sides. South-eastward slopes are relatively steeper whereas north-westward slopes are flatter and uniform, with an average of 20 m per km. Some of the area is under Barani farming while the rest of it is irrigated with groundwater. The soil is composed of alluvial material which seems to have been formed by the action of Wana Toi and Wacha Khawar.

Per Capita Land Resource Availability

The population of SWA is dominated by Mehsuds (52%) followed by Ahmadzai Wazirs (35%) and the remainder 13% are made up of smaller tribes. Geo-graphical area is 24.3% of FATA's and FRs' geographical area. Population density is 86 persons per km^2 almost half of the average density of FATA and FRs. SWA's cultivated area is 0.018 million ha, whereas 0.0465 million ha are available as culturable waste. Cultivable area is 0.0646 million ha. Only 0.007 million ha are irrigated (FATA-S 2009a), representing 11% of cultivable or 39% of cultivated area. Around 61% of the cultivated area is under Barani or Spate irrigation farming systems (Figures 2-4 and 2-5).

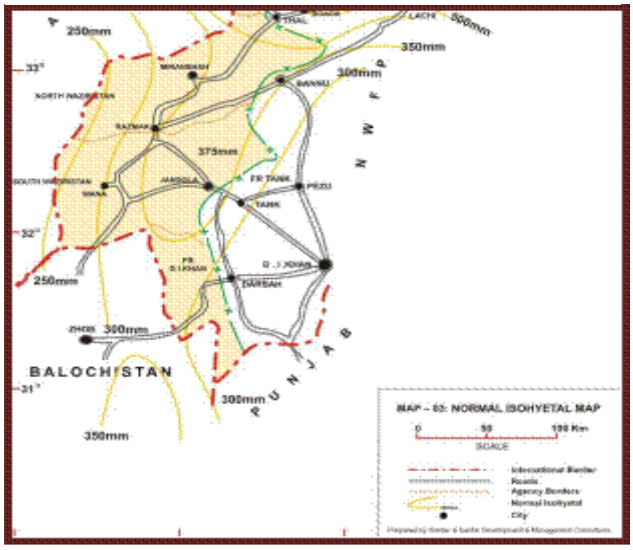
FIGURES 2-4 and 2-5 BARANI AND SPATE IRRIGATION FARMING SYSTEMS OF SWA

2-1-2 WATER RESOURCE AVAILABILITY

Precipitation

Westerly disturbances[8] contributed 70% to precipitation and the rest was attributed to monsoonal disturbances[9]. Mean annual rainfall data of FATA was used to develop iso-hyetal map (Figure 2-6). SWA's annual rainfall varies from 250 to 450 mm with an average of 350 mm. Snowfall is not included in the rainfall. Most of the rainfall is received in the winter season. Rainfall in the dry year may be half and at least 50% more in the wet year from that of the average.

FIGURE 2-6: MEAN ANNUAL RAINFALL ISO-HYTEL MAP



Source: Sardar & Sardar

River Basins and Hydrology

Tank Zam Basin: Tank Zam has 5,400 km^2 catchment area and forms as a result of a number of hill-torrents spread over a wide periphery of mountains around its basin. It originates in the form of Tangi Algad in Spin Chuwar area of Ramah. Near Zawar Shobi Khel, the stream adopts the name Tank-i-Zam which is ultimately called Tank Zam. At Datatec, Shakur River joins Tank Zam which drains the flows from Ahmad Zai and adjoining areas. Tank Zam flows out of the tribal boundary through D.I. Khan District and then joins the Indus River. Most of the drainage area of Tank Zam lies in the northern part of SWA.

Gomal River Basin: Gomal River Basin comprises an area of 34,300 km^2, part of which lies in SWA and drains the southern part. This area can be divided into two sub-basins - Wana Toi and Spin Tangi. Wana Toi sub-basin consists of the drainage basin of Wana Toi and its tributaries. Northern Tributaries of Wana Toi originate from Ahmad Zai hills. Wana Toi ultimately flows right through the Wana Plain from right side of Wana Town and later on it joins Gomal River near Toi Khura Posta.

---

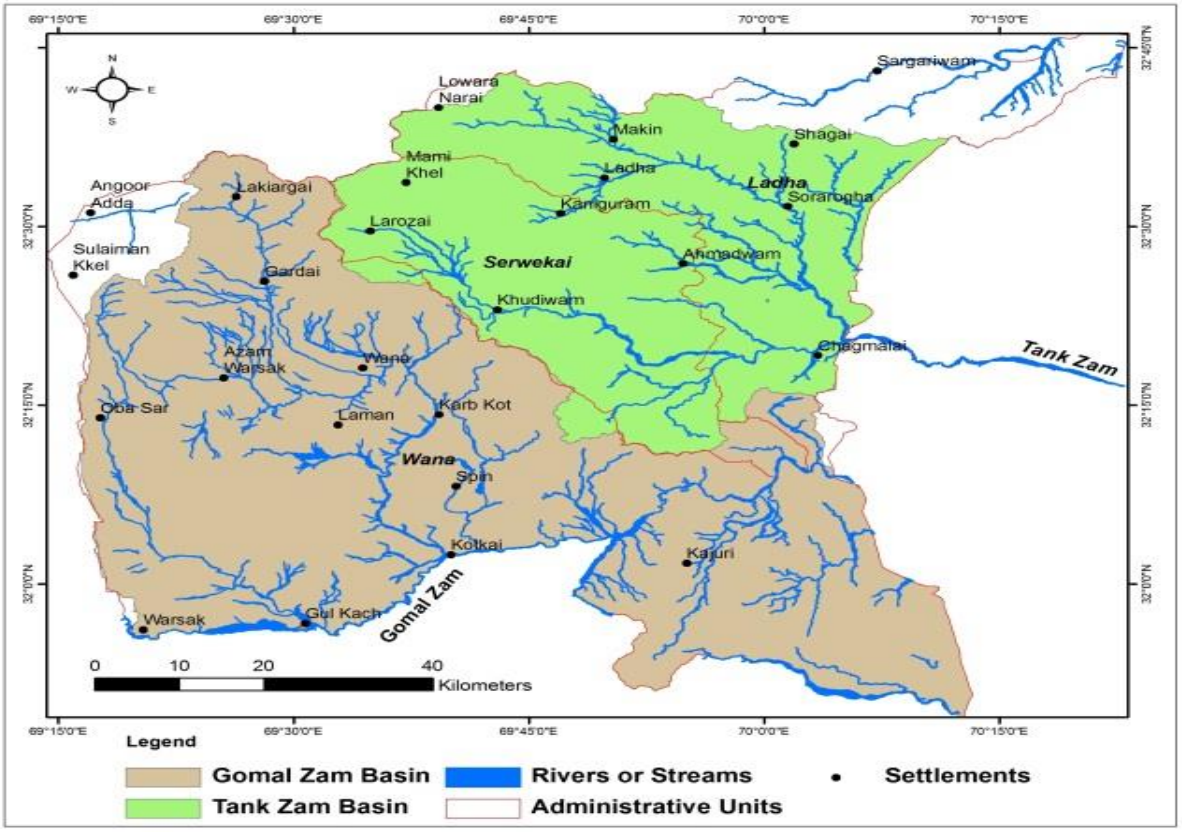
[8] *Western Disturbance is the term used in India, Pakistan, Bangladesh and Nepal to describe an extra-tropical storm originating in the Mediterranean, that brings sudden winter rain and snow to the northwestern parts of the Indian subcontinent.*

[9] *Monsoons, or rainy seasons, are a shift in wind direction which causes excessive rainfall in many parts of the world including Asia, North America, South America, and Africa. The primary mechanism behind a monsoon is a shift in global wind patterns. During most of the year, winds blow from land to ocean making the air dry. Winds originating from land are called continental. During certain months of the year, the winds begin to blow from the ocean to the land making the air moist. Winds originating over a body of water are called maritime. This moist ocean air is what causes monsoonal rains over many countries.*

Spin Tangi Sub-basin is a smaller basin and joins Gomal River downstream of the confluence of Wana Toi. The Gomal River flow downward and receives flows from Zhob River draining Balochistan area before joining Indus River through D. I. Khan.

SWA's area is drained by tributaries of Gomal and Tank Zam Rivers (WAPDA 1998). It contributes to the Gomal Zam Dam reservoir[10] and provides flows to the command area of the Tank Zam used for irrigation. The rights on water of Gomal Zam are not clearly defined. While constructing the Gomal Zam dam, interventions regarding watershed management and Spate irrigation in upstream were not included in WAPDA's projects (Figure 2-7).

FIGURE 2-7: GOMAL AND TANK RIVER BASINS



Source: Survey of Pakistan & Google Earth

Surface Water

SWA receives an average annual rainfall equivalent to 2.5 billion m3. Using rainfall-runoff coefficient of 30%, an average annual runoff of 0.750 billion m3 is generated. Actual runoff will be more because snow is received at higher elevations. Higher rainfall-runoff coefficient of 50% can be assumed considering steep slopes, poor vegetal cover and under-predicted rainfall as climatic stations are located in valleys. This might increase runoff to 1.25 billion m3 in a wet year. Area is drained by major streams outfall in Gomal and Tank Rivers (Figure 2-7).

A traditional approach of constructing structures and leaving development of Spate irrigation to the farmers have been emphasized by FDA and FRDP (CHF and Sardar & Sardar 2009; ADB-FRDP 2010). While a large number of traditional structures have been constructed but failed, Spate irrigation

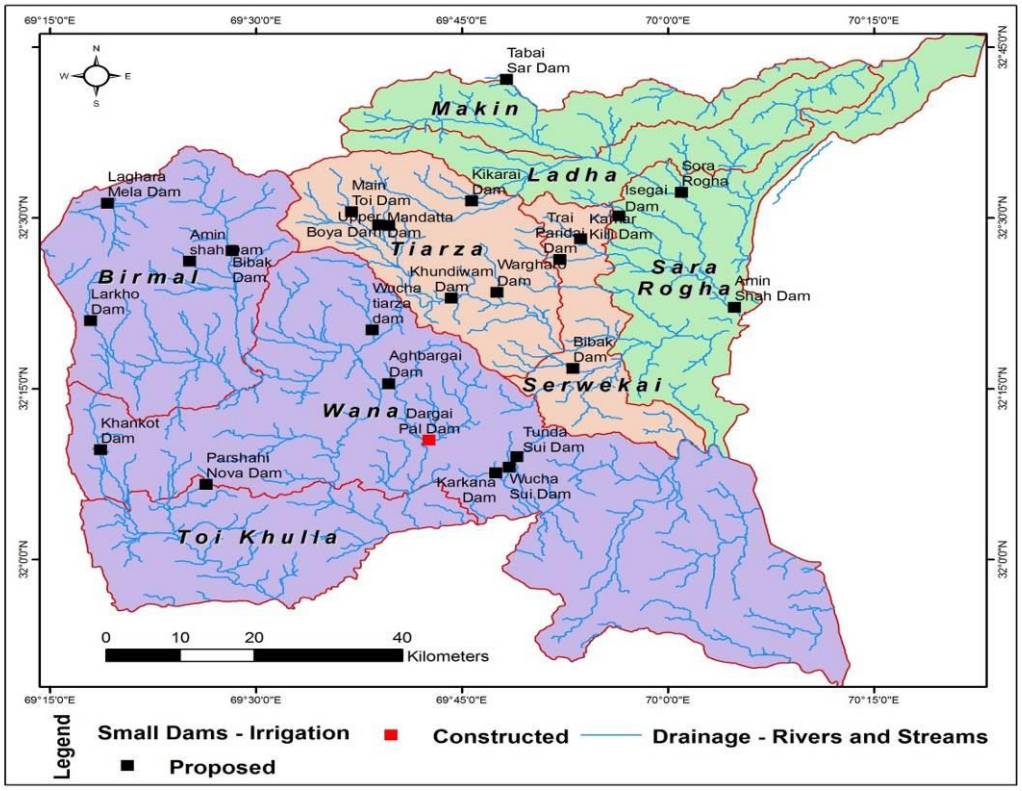
[10] *Gross Command Area (GCA) of the project is 109,732 ha comprising of 51,506 ha in Tank, 44,922 ha in Kulachi and 13,304 ha in D. I. Khan. Culturable Command Area (CCA) is 77,353 ha comprising of 38077 ha in Tank, 35318 ha in Kulachi and 3958 ha in D. I. Khan. The project will provide 316,232 Acre-feet of water annually to irrigate about 77,353 ha.*

by farmers appears to be more sustainable. Delay action dams are not feasible until linked with watershed management and livelihood. Recharge is effective if watershed management is integrated with storage. Delay action dams are filled quickly and it is difficult to identify potential recharge sites. Options of cascades of sub-surface and sand dams are more sustainable.

Potential Sites for Small Dams

Around 76 dam sites have been identified of which 24 have been finally recommended for feasibility studies (Figure 2-8). Of the 24 dams selected for detailed feasibility study, the distribution of dams in the three administrative units is given in Table 2-1. There are 7, 6 and 11 dams' sites in Ladha, Serwekai and Wana administrative units, respectively.

FIGURES 2-8: POTENTIAL SMALL DAM SITES IN SWA



Source: Information from FDA and by using data of topography and locations of potential dam sites

TABLE 2-1: DISTRIBUTION OF 24 DAMS' SITES SELECTED FOR FEASIBILITY IN THE THREE ADMINISTRTATIVE UNITS OF SWA

No.	Administrative unit	Number of Dam Sites Selected for feasibility	Range of Command Area (acres)	Average Command Area (acres)
1	**Ladha**	7	306-2335	879
2	**Serwekai**	6	430-1441	875
3	**Wana**	11	198-2410	857
Total/Average		**24**	**306-2410**	**868**

Source: FDA

The command area of these 24 dams varies between 306 to 2,410 acres. The average command area for the three administrative units of Ladha, Serwekai and Wana are 879, 875 and 857 acres, respectively. Although, there is wide variability in the command area of 24 dam sites, however, the average command area for the three administrative units is almost same. Thus estimation of cost is much easier considering the thumb-rule of average unit cost of developing an acre of command area.

All of the potential dam sites except one (recharge dam) are suitable for irrigation. The study enlists a number of site features: location of dam with locality; Survey of Pakistan Sheet Number; catchment area; status of stream (perennial or non-perennial); average annual flow; type and height of dam; command area; and, ranking of site.

The dams are not recommended in isolation rather these have to be integrated with the development of perennial surface irrigation schemes or with Spate irrigation schemes, so that the objective of the development schemes remains development of livelihood from irrigated agriculture.

Hill Torrents

There are eight major streams and number of Hill-Torrents in SWA**.** Different streams are feeding the Gomal and Tank Zam Rivers (Table 2-2 and Figure 2-7). Floodwater is partially used for Spate irrigation and the rest is available for future development. Hardly any support has been provided to integrate Spate irrigation projects with indigenous knowledge. Floodwater is still considered in the context of safe disposal rather than its utilization.

TABLE 2-2: MAJOR RIVER/HILL TORRENTS OF NORTH WAZIRISTAN, SWA AND ADJACENT FRs

S. No.	North Waziristan Agency, FRs Bannu and FR Lakki	South Waziristan Agency, FRs Tank and Peshawar	FRs Kohat and D. I. Khan
1	Gurzurai Alzad	Gomal River	Sara Tang Alzad
2	Tochi River	Zhob River	China Alzad
3	Kanioazhi Alzad	Tank Zam	Jammu Alzad
4	Kurram River	Shahur River	Zera Alzad
5	Baran River	Tonga Toi	Kahi Alzad
6	Shaktic River	Wuch Alzad	Sara Tang Alzad
7	Khaisora River	Jarunai Khwar	Toi Nallah
8	Katira River	Sperzhi Khwar	Chaudwan Zam
9	Stara Zakha Alzad		Khulwali Nallah
10	Kaitu River		Manda Nallah
11			Ramak Nallah
12			Galistan Nallah

Source: FDA

Groundwater Resources

Water table in SWA ranges between 8 to 130 m. Groundwater is available through springs, kareze and tubewells/wells. Groundwater is a minor resource of water available in SWA but due to its reliability most of the high value crops are grown using groundwater. Kareze are now almost non-functional because of heavy abstraction of groundwater. Sixty public tubewells were installed in SWA by FDA including 28 tubewells under KFW (Table 2-3).

Table 2-3: Tubewells installed in South Waziristan by KFW

Area	No. of Tube-wells	Year of Completion	Completion Cost (Rs, Million)	Command Area (Acres)
Zarmilan	17	1991-92	8.2	2,550
Torwam, Ziarkoi & Wadan Challarn	3	1992-93	1.95	300
Umar Razhzai Barwand & Shaki	12	1992-93	5.41	12,000
Wana	28	94-95	45.45	3,709

Source: FDA

Strata charts of 137 test wells/tubewells are available for SWA. Strata charts pertain to the major parameters of: depth of tubewells; length of screen used; parts of aquifer where screen has been used; type of screen; diameter of screen; existing water table depth; and, depth at which water table struck

(water table, semi artesian, or artesian conditions). The strata charts indicate that depth to water in the SWA varies from 8 m to 130 m. Maximum depth drilled is 170 m while in some cases tubewells ranging in depth 60 to 90 m have been installed. Average discharge of tubewell is around 14 lps commanding average irrigated area of 12.5 ha (CHF and Sardar & Sardar 2009).

It is estimated that the recharge will be at least 125 million m^3 in a wet year considering a recharge coefficient of 0.05. Future abstractions of groundwater must be restricted to areas where water table is shallow and recharge potential is high i.e. along the banks of streams and Rivers in the valleys to pump water cost-effectively.

The approach suggested in various studies (NESPAK & BAK; CHF & Sardar & Sardar 2009; ADB-FRDP 2010) is based on traditional concepts of managing floodwater either through storage/delay-action dams or flood control structures in FATA. Experience in Balochistan shows that construction of delay action dams hardly contributed in recharging regional groundwater. Their contribution was limited to localized shallow groundwater. The spatial information regarding private tubewells, dugwells and open wells in SWA is not available. There are 120 water supply tubewells for potable water installed by the public sector.

In addition to 120 tubewells installed for domestic purposes number of dugwells and tubewells are installed in SWA under the ADP and projects financed by donor agencies. The data provided by the FATA Secretariat indicated that 112 dugwells were constructed during the period of 2004-08 and 100 tubewells were constructed during the period of 1987-08 for irrigation purposes. The details are presented in Table 2-4.

The largest number of dugwells is located in the Serwekai Tehsil, whereas the largest number of tubewells is located in the Wana Tehsil. Tubewells are largely located in the Wana administrative unit and dugwells are well distributed in all the *Tehsils*. This shows that shallow groundwater is being exploited in all *Tehsils*, whereas tubewells are very well linked with the availability of electricity due to the use of submersible pumps, which can be operated only with electricity.

TABLE 2-4: NUMBER AND AVERAGE COMMAND AREA OF DUGWELLS AND TUBEWELLS IN THE *TEHSILS* OF SWA

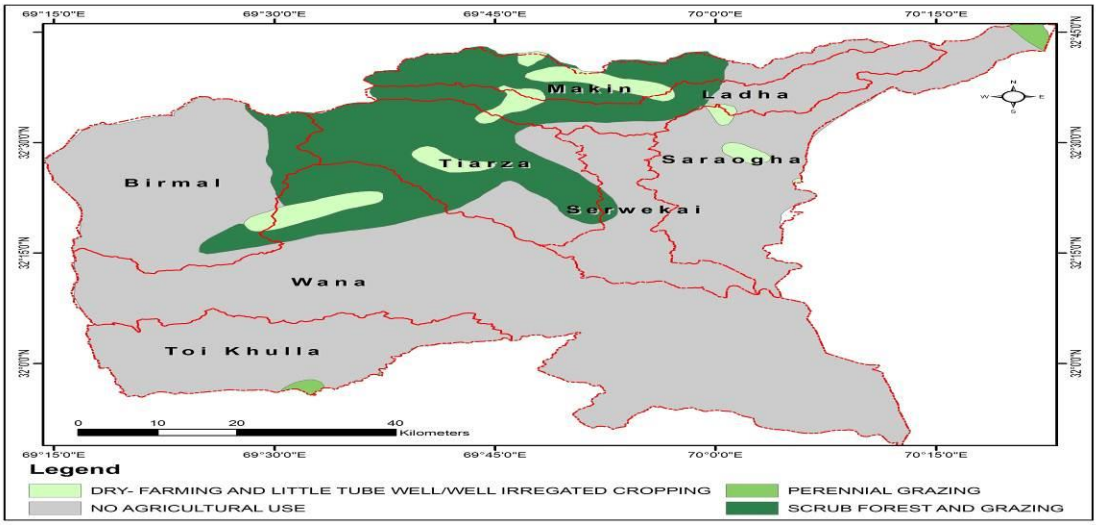
No.	*Tehsils*	Dugwells		Tubewells	
		Number	Average Command Area (acres)	Number	Average Command Area (acres)
1	**Wana**	20	6.9	72	87
2	**Shakai**	6	5.0	2	60
3	**Birmal**	2	7.5	0	0
4	**Serwekai**	34	6.9	16	82
5	**Sararogha**	13	5.8	8	95
6	**Makeen**	11	7.9	2	100
7	**Ladha**	7	8.6	0	0
8	**Tiarza**	3	7.0	0	0
9	**FR D. I. Khan**	16	4.9	0	0
Average		**112**	**6.6**	**100**	**86**

Source: FATA Secretariat

2-1-3 LAND USE – POTENTIAL AND CURRENT STATE

Potential land use map of SWA is based on the reconnaissance surveys conducted by Soil Survey of Pakistan (Figure 2-9). The major potential land use in SWA is range and forestry. There is potential for developing irrigated agriculture, range and forestry in SWA as 46,500 ha of culturable waste is available for development if water is made available.

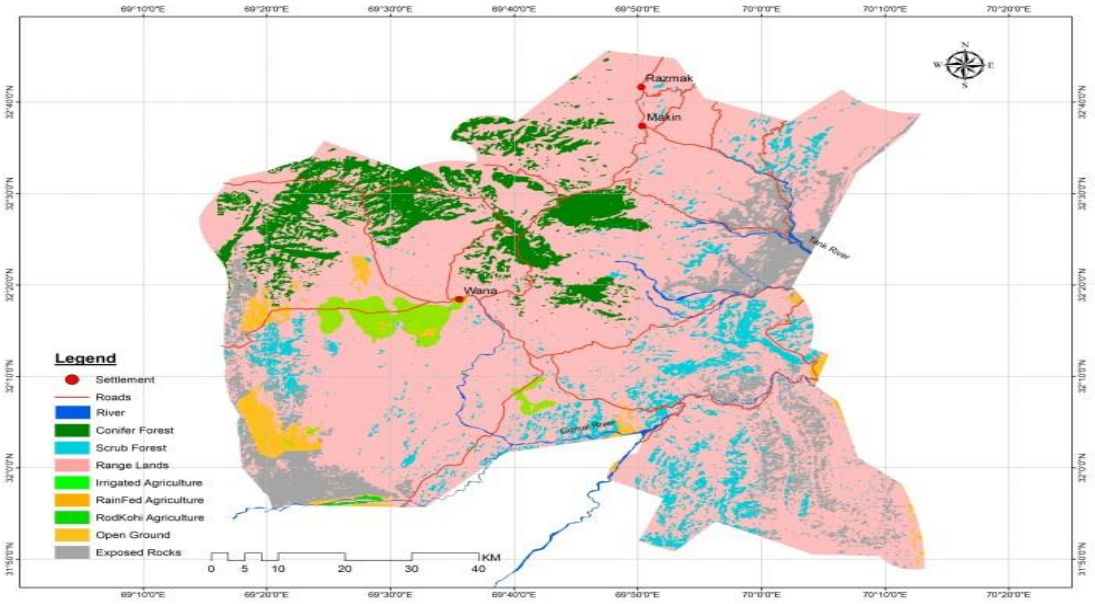
FIGURE 2-9: POTENTIAL LAND USE SYSTEMS OF SWA



Source: Soil Survey of Pakistan

Current land use map of SWA was developed using recent satellite images available with PARC. Major land use is rangelands and forests (coniferous, broad leave and scrub), irrigated agriculture and water bodies (Figure 2-10). The satellite maps prepared are not validated in the field but there is similarity in the area identified for forestry in the two maps. Currently, there are 11,000, 7,000 and 2,000 ha under Barani and Spate agriculture, irrigated agriculture and coniferous forest, respectively.

FIGURE 2-10: CURRENT LAND USE SYSTEMS OF SWA



Source: PARC 2012

Livestock is owned by 98 percent households and grazing is allowed to transhumant. It is expected that due to improved security situation the population of livestock will increase in future and both natural vegetation and stockwater have to be managed to have sustainable livestock production.

2-1-4 CURRENT SOURCES OF IRRIGATION AND WATER UTILIZATION

Major sources of irrigation are based on groundwater – springs, tubewells and deep tubewells (turbines). Around 52.9% water used in irrigated agriculture comes from springs followed by

tubewells and turbines (15.9%), streams (13.5%) and the rest (17.7%) is contributed by rainfall. Detail distribution of sources of water for irrigation for 7 *tehsils* is given in Table 2-5

TABLE 2-5: SPATIAL DISRIBUTION OF PERCENT WATER USE FROM DIFFERENT SOURCES IN SWA

Administrative Division	Tehsil	Sources of Water (%)					Total
		Rainfall and Surface Water		Groundwater			
		Rainfall	Streams	Springs	Tubewells	Turbine	
Ladha	Ladha	21.4	7.1	57.1	14.3	0.0	100
	Makin	6.3	6.3	87.4	0.0	0.0	100
	Sararogha	21.1	15.8	63.2	0.0	0.0	100
Serkewai	Serkewai	26.1	17.4	56.5	0.0	0.0	100
	Tiarza	9.1	18.2	72.7	0.0	0.0	100
Wana	Wana	7.7	7.7	0.0	7.7	76.9	100
	Birmal	0.0	0.0	40.0	0.0	60.0	100

2-1-5 DISTRIBUTION NETWORKS

Domestic water supply schemes are small in size and characterized as isolated schemes. The distribution networks are also small and isolated. If designed and constructed properly they can be managed effectively by private sector operators. Most of improved domestic water supply schemes are based on abstraction of groundwater from closed wells, tubewells and springs. The distribution network is well established and managed[11] by the Public Health Engineering Department (PHED). Some of the schemes have community collection points and consumers are not charged.

Agriculture is the largest user of water as it consumes over 85% of available water and the rest is utilized for domestic, industrial and other uses. **Irrigation schemes** are also isolated and largely managed by the communities. For the purpose of rehabilitation of irrigation schemes largely due to deferred maintenance, FDA provides support from the ADP. Only perennial surface irrigation schemes have more than one user and thus distribution networks are provided. Tubewell irrigation schemes are individually owned. **Stockwater** system is not available and livestock water needs are largely met from domestic water supply and irrigation schemes.

Distribution networks for domestic water supply and participatory surface irrigation schemes are inefficient due to operational losses. The availability of free electricity for pumping of groundwater (both for domestic and agriculture) has resulted in wasteful use of water, deferred maintenance of distribution networks and low value assigned to groundwater.

2-1-6 MONITORING OF WATER RESOURCES

Currently, there is no system of monitoring of water[12]. If some data is collected it is hardly used for planning of irrigation schemes. The concept of river basin management has to be adopted for any meaningful management of water resources. Assessment of resource availability for major river basins is essential. Ultimately, water balance has to be updated after every three years considering the internally generated water, inflows from other basins, outflow from the basin and water consumption by various sub-sectors. Current data generated by ADB-FRDP (2010) is largely based on computing techniques for Bajaur, Mohmand and Khyber. Data adequacy is limited for SWA. Water entitlements have to be considered while developing potential for further development of water. The lower riparian should not be deprived from their water rights in the process of development. Water monitoring

[11] *The O&M cost is largely subsidized by PHED and in terms of financial management it is not well managed. The physical structure are managed by PHED and are fully subsidized.*

[12] *River and stream flows data is the responsibility of WAPDA and this data has not been available since 1995. Groundwater tubewell logs are available for public sector tubewells only from FATA-DC and from some studies conducted in 1999 by FATADC-KFW.*

system proposed in the ADB Water Resources Management Plan (2010) for Khyber, Bajaur and Mohmand Agencies may be extended for the SWA and adjacent FRs and a study must be initiated for the identification of sites for the installation of rain gauges and stream gauging stations.

2-1-7 INSTITUTIONAL FRAMEWORK

Under the Constitution, FATA is included among the "territories" of Pakistan (Article #1). After 2002, all the development functions were rested with **FDA,** as in 2006 structure of FDA was expanded under the **FATA Civil Secretariat**. Still, there is certain ambiguity in O&M of public-sector schemes as a well-defined structure does not exist. There are merits in developing private operators for O&M of the schemes and regulated by the stakeholders' institutions. Institutional framework of FDA is not well developed for water and agriculture sectors. General Manager (Technical) has overall responsibility of managing development sectors. Under GM (Technical), there is a PD (Small Dams) to implement ADP. There are serious gaps in institutional framework to evaluate overall institutional arrangement within FDA to manage water and agriculture. The distribution of business to various Departments is given in the SCHEDULE-I of Rule 3(1). The O&M and extension activities are handled by the line Departments.

Federal Ministry of Water and Power: It deals with all water sector projects financed under the PSDP and also responsible for formulation and implementation of water sector policy and strategy.

Federal Ministry of Food Security and Research: It is responsible for water management programmes at the farm level and provides support to FATA under all the national programmes.

WAPDA: In the water sector all the development works are not entrusted to FDA. **WAPDA** is responsible for the development of medium and large hydro-power projects.

FDA: It is supposed to construct small scale water and irrigation schemes and handover either to communities or to the Irrigation Department (ID). ID is responsible for managing the small dams, irrigation and flood control schemes. The role of ID is now limited to O&M of the irrigation schemes, whereas development work is the responsibility of FDA and WAPDA.

FATA-PHED: It is responsible for development and O&M of the water supply schemes largely in the urban areas.

FATA-LGRDD: It is sometime involved in water supply schemes in rural areas, smaller in terms of investment. The role of the PHED and LGRDD in water supply sector has been clearly defined.

Agriculture Department: Agriculture Department is largely involved in routine activities of agriculture extension. On-Farm Water Management is the responsibility of Director Irrigation.

Stakeholders' institutions: Water Users' Associations and Farmers' Organizations under the Water Users' Association Act of 1982 and the Provincial Irrigation and Drainage Authorities Act of 1997 have been promulgated in KP Province. These institutions are almost non-existent in SWA and even where they exist they are not effective.

2-1-8 REGULATORY FRAMEWORKS

There is no regulatory framework for SWA largely due to the reason that most of the regulatory frameworks like Canal and Drainage Act 1873, Irrigation and Drainage Authority Act 1997 and Water Users' Association Act 1982 are provincial regulatory frameworks.

Draft National Water Policy was formulated during 2005 and modified in 2006 and it is still in the approval process. Some of the policy options have been implemented during the last 6 years.

2-1-9 GOP'S DEVELOPMENT STRATEGY

FATA Sustainable Development Plan 2007-15 (FATA-S 2009) aims to steer development planning in a new direction, focusing on people at the grass-roots level instead of the focus on the elites. It identifies people as the focus of development as well as its instigators. The key objective of FATA-SDP is to foster social and economic development based on principles of equity and participation. SDP addresses the basic needs that underline the existing socio-economic disparities. It outlines measures to improve services, upgrade infrastructure and promotes sustainable use of natural resources. It has provided overall development strategies for various sectors based on issues while formulating Sustainable Development Strategy. Elements of strategic framework relevant to water sector are reviewed and reproduced as under:

- Develop capacity of local people to enable to provide services in social and technical sectors;
- Rationalize balance between infrastructure and human resources development;
- Strengthen participation through social organization and involvement of local beneficiaries;
- Bolster institutional and human capacities of local service providers to enable them to implement and monitor the ADPs;
- Link savings and credit facilities with development of social organizations at grass root levels*;*
- Improve working and living facilities for service providers to ensure better service delivery;
- Develop and update baseline data and indicators;
- Provide a regulatory framework for investment, O&M and environmental management;
- Ensure availability of financial services for enterprise development;
- Ensure that development is ecologically sustainable, environment-friendly and socially acceptable for restoration and sustainable use of natural resources.

Domestic Water Supply Schemes

Most of the domestic water supply schemes of FATA are financed under the ADP. More than Rs. 1.0 billion have been made available during pre-FSDP period of 1999-05 for development of domestic water supply schemes and a total of 1,058 schemes have been completed in FATA.

In addition to the ADP, other federal- and donor-financed projects have domestic water supply components. The DERA (Drought Emergency Rehabilitation Assistance) Programme is a federally funded project with a domestic water supply component for FATA of Rs. 170 million. The "Clean Drinking Water for All" initiative funded by federal government provided Rs. 69 million over a period of 5 years. FRDP (FATA Rural Development Programme) was an ADB-financed initiative covering Bajaur, Khyber and Mohmand Agencies. The domestic water supply component had an allocation of Rs. 632 million for duration of five years (2005-10).

The funding planned for the domestic water supply and sanitation schemes under the F-SDP during the period of 2006-15 is around Rs. 4.04 billion.

Review of the ADP 2012-13 for Public Health Engineering indicated that total cost of on-going and new schemes for domestic water supply is Rs. 994,052 million. Budget allocations for 2012-13 are Rs.108,442 million. The throw forward beyond 2012-13 is Rs. 541,714 million.

Review of the ADP 2012-13 for Rural Development Sector indicated that total cost of on-going and new schemes are Rs. 116.975 millions. Budget allocations for 2012-13 are Rs. 23.337 million. Throw forward beyond 2012-13 is Rs. 24.425 million. The actual cost, allocations and throw forward for the

water supply and sanitation schemes is less as the rural development sector includes small roads and others.

Water for Agriculture – Irrigation

Irrigation development projects are also funded from the ADP. The ADP financed 404 schemes during 2001-05. In the F-SDP existing and new irrigation schemes have been financed. The federal government financed NDP aimed to improve surface irrigation schemes. FATA received Rs. 70 million for the development of small scale irrigation schemes under the NDP. But due to problems[13] associated with the implementation of the NDP the planned work could not be completed. The National Watercourse Improvement Programme provided Rs. 837 million to FATA for the improvement of watercourses. Progress in FATA was relatively slow. Other government-sponsored initiatives include DERA Project with a provision of Rs. 400.0 million.

In addition to the federal funding, donor-supported irrigation projects were also completed or in operation. These include: a) World Bank assisted On-Farm Water Management Project for the improvement of watercourses and irrigation channels through provision of Rs. 107 million. Farmers contributed Rs. 23 million for sharing of the cost. Major part of this project has been completed during 2007-08 but later on it is facing funding problems from the federal government; and b) FRDP provided budget of Rs. 742 million for irrigation.

The funding planned for irrigation schemes under F-SDP during 2006-15 is around Rs. 7.945 billion.

Review of the ADP 2012-13 for the Irrigation Sector indicated that total cost of on-going and new schemes are Rs. 897.037 millions. Budget allocations for 2012-13 are Rs. 182.104 million. Throw forward beyond 2012-13 is Rs. 531.82 million.

2-1-10 DONOR DEVELOPMENT STRATEGIES

Donor development strategies have also been outlined under various reports (WB, ADB and GOP 2009; ADB-FRDP 2010). The joint strategy of the ADB, World Bank and Government of Pakistan for the DNA (Damage Need Assessment) was reviewed. Strategic objective of carrying out and implementing the DNA is to help create conducive conditions for immediate recovery and rehabilitation. The **Key Strategic Actions** suggested by donors (World Bank and ADB) jointly with the Government of Pakistan for water and agriculture sectors are:

- Quick recovery of farm production systems by assigning highest priority to help farmers and other partners reliant on agriculture to restart production, input availability and marketing;
- Targeting the most affected communities and households through reconstruction efforts as quick, rapid and fair.
- Introduction of appropriate new technologies in water use and crop production for revitalizing small-scale income generation enterprises.
- Improvement of support services with active involvement of private sector to be instrumental in introducing new technologies and income generation activities, in promoting market linkages and helping to diversify production, and to provide rural financial services so that activities become sustainable.
- Supporting water users' associations and farmers' organizations to play: a central role in the recovery process; planning and implementation of key activities; identification of target groups and their needs, distribution of inputs, and monitoring of assistance activities to ensure equitability and transparency; and channel funds though well proven mechanisms.
- Informing local people in implementing and monitoring reconstruction work using a well-defined communications strategy covering amount and type of assistance being provided.

[13] *The National Drainage Project (NDP) was implemented during 1998-2005. Initially FATA was not a part of this project but then later it was included. Due to shortage of time and intermittent funding the progress was slow. The project was put on hold by the Military Monitoring Team.*

The proposed strategy by donors and the Government of Pakistan will facilitate a demand-driven rapid recovery and sustainable revitalization of water and agriculture sectors. Some of the activities, such as the restarting crop production, are expected to be implemented fast and would result in a fairly rapid rebound in production. However other activities, such as the introduction of new technologies and income generation are expected to take longer.

2-2 OPPORTUNITY ASSESSMENT FOR WATER

Water is not considered as an economic good and the market potential is thus limited. There is high demand of water for domestic and stockwater. It is difficult to assess economic or market value of water because it is not priced. It is a local norm that water cannot be priced and therefore water for domestic and stockwater is considered a free commodity. In reality, there is a need to assign value to water and then in a gradual process one can lead towards pricing the commodity. Water is considered a social good. In the current context it is not possible to consider water an economic good even for domestic use. For agriculture, there exists groundwater markets, where farmers can sell water to compensate the O&M cost of tubewells. The concept of groundwater markets can be further built to value water, if electricity is priced. There is no market for surface water for agriculture. Farmers sometime trade water to compensate requirement of fellow farmers.

Market Potential of Sub-sectors

Domestic and agriculture are the major sub-sectors of water use in SWA. Agriculture is the largest sub-sector and currently it accounts for 85% of total water use and the rest is utilized by domestic, livestock and industrial sub-sectors. Livestock water needs are met from schemes designed and constructed for domestic and agriculture sub-sectors, or, they use water available in natural depressions. Therefore, only domestic and agriculture sub-sectors are included in the SWOT analysis.

2-2-1 SUB-SECTOR: WATER SUPPLY AND SANITATION

Water for people includes water used for domestic purposes covering water for drinking, household use, car washing, landscape, sanitation, etc. The water for people is considered as a right and as a social good. Culturally, the first right for water goes to people, followed by animals, industry, crops and lastly environment. Everyone has a right to safe water for domestic use. The demand for water for people is increasing due to increased population and urbanization. Currently only 54% of SWA's population has access to drinking water from protected sources but in most of the cases water is clean but not safe due to chemical and biological impurities. Access to sewerage system is much lower and most of the diseases are water born including diarrhea. Sewerage is disposed to freshwater streams.

Investment Options for Water Supply and Sanitation

Provided below are investment options for improving SWA's water supply and sanitation.

- **Early Recovery of Damaged Water Supply Schemes**: For the rehabilitation of damaged water supply schemes owned by PHED, USAID may initially invest for rehabilitation of damaged water supply schemes without considering the requirement for sanitation. There are schemes outside the PHED and largely developed and managed by the communities. The rehabilitation works should be properly prioritized and phased. The rehabilitation of water supply schemes must be done with an objective to reduce the O&M cost and increase participation of water users and private sector operators in operating, maintaining and managing the schemes.
- **Reconstruction of Water Supply and Sanitation Schemes**: The reconstruction of water supply schemes will include sanitation schemes for disposing sewage and bio-remediation for reuse of treated water for agriculture.
- **Long Term Strategy for Water Supply and Sanitation:** The long-term strategy focuses on extending coverage and enhancing quality of services by using new and innovative technologies both for water supply and sanitation schemes.

SWOT analysis for domestic water supply is provided below.

Strengths	Weakness
• Around 54% of SWA population has access to fairly clean and relatively safe water • Public-sector domestic water supply schemes are largely based on groundwater (wells, tubewells, springs) and water is fairly clean and relatively safe at source • Knowledge and experiences for developing and managing improved domestic water supply systems are available locally	• About 46% of the population does not have access to clean and relatively safe water • Quality of water from open surfaces (spring, open wells, ponds) is affected due to entry of wastes and wastewater • Ponds and wells dried during droughts and availability of water is a major challenge. Local population has to spend more than an hour to collect water • Water consumption from open sources is one of the reasons for spread of water born diseases • Free electricity is provided for pumping of water • Water fee is not enforced
Opportunities	**Threats**
• Half of the population still requires facility for clean drinking water • Use of pipe water conveyance systems for springs and wells to avoid pollution • Fencing pond area, provision of facility for stock water and washing of clothes can help to manage quality of water • Technology for sand filter and hand pump is available for providing clean water from ponds and springs for multiple uses	• O&M cost will increase with increased coverage of domestic water supply resulting in additional burden on the PHED • Lack of ownership among communities to take over O&M of water supply schemes and hire services of private operators • Lack of enforcement for charging electricity and water • Areas are not fully recovered from militancy and any future military action would affect the investment

2-2-2 SUB-SECTOR: IRRIGATION AND WATER MANAGEMENT SCHEMES

Agriculture sub-sector includes minor perennial irrigation (surface and groundwater) and Spate irrigation schemes through diversion of floodwater. Floodwater is normally taken in the context of safe disposal rather than effective utilization. This is why most of the schemes are aimed to control floods through construction of structures and not for generating livelihood. Hardly any scheme is conceived in totality, where scheme is aimed to develop Spate irrigation for livelihood rather than looking at flood control as an objective. This shift in strategy is essential as most of the water resources available in SWA are from surface water. Groundwater is already under stress and in future this resource has to be kept largely for domestic water use to avoid serious inter-generational issues.

Minor perennial irrigation schemes (surface and groundwater) are sustainable in water availability for both crop seasons. Water of perennial streams is diverted for year round farming including fruits and vegetables. Similarly, groundwater (springs, wells and tubewells) is also used for perennial irrigation schemes. Groundwater schemes are very effective for generating profitable farming if high value cropping pattern is adopted. Groundwater schemes are not designed to have sustainable abstractions on longer term basis. Due to indiscriminate abstraction of groundwater the water table keeps getting lower. Rainwater/snow harvesting for dry farming and watershed management is also included here.

Investment Options – Irrigation and Water Management Schemes

Four types of irrigation and water harvesting schemes are included for investment in the agriculture sub-sector of water use. In close consultation with SWA stakeholders, the detailed feasibilities and design for each and every scheme will be made based on an effective need assessment and appraisals. The traditional concept of physical interventions is not recommended as a comprehensive approach is needed to link water development and management for enhanced and sustainable livelihood. The existing potential of development and management of water in conjunction with active participation of private sector and local enterprises would lead towards sustainable livelihood generation. The upgraded infrastructure in terms of road construction will be considered while developing forward and backward linkages for provision of services and disposal of the marketable products. Value addition in agriculture will be linked along with productivity enhancement programs so that high-efficiency and high value agriculture can be introduced, which can compete with other sources of livelihood.

2-2-2-1 SUB-SECTOR: IRRIGATION SCHEMES - MINOR PERENNIAL SURFACE

Around 3-10% area of the *tehsils* except Birmal is irrigated by minor perennial surface irrigation schemes and these schemes are providing water for year round cropping. The productivity and sustainability of these schemes can be improved as the current productivity of various crops can be doubled with the adoption of best practices. These schemes are largely located in Ladha and Serwekai administrative units.

Investment Options for Minor Perennial Surface Irrigation Schemes

The suggested interventions are:

- Re-habilitation of damaged perennial surface irrigation schemes through improvement of diversion structures; watercourse conveyance and links from farm to metaled roads
- Provision of services to farmers for laser leveling of fields through provision of Laser Levelers to the local Tractor Rental Companies along with capacity building of operators
- Linkages with private sector enterprises for provision of quality inputs to the water users – seed, fertilizers, pesticides, machinery, etc.
- Construction of storage dams and ponds for stockwater and for agriculture to meet shortfall
- Furrow irrigation and planting on laser leveled beds for improving water productivity.

SWOT analysis for perennial surface irrigation schemes is provided below.

Strengths	Weakness
• Cost-effective both in investment and O&M, if schemes are effectively constructed and managed • Surface water schemes can be operated as gravity-flow schemes – no energy requirement • Potential of further development of perennial surface irrigation schemes as balance water is still available • Adequate and relevant experience is available in KPK and GB for participatory irrigation management which can be adopted for SWA • Storage of excess water in small reservoirs to mitigate the impacts of floods and droughts.	• Current designing procedures have in-built weaknesses where rights of downstream users' are not considered while developing schemes hence traditional Spate irrigation schemes are neglected • Schemes are designed to thinly distribute perennial water rather than enhancing productivity • Water productivity at farm level is not the design objective • No consideration for storage of excess water at tail-end reaches resulting in wastage of water • Low value assigned to perennial surface waters No cost recovery and no water fee imposed
Opportunities	**Threats**
• Pipe-flow water conveyance irrigation system using PE/PVC pipes can eliminate water conveyance losses and reduce O&M cost in the existing schemes • Future perennial surface irrigation schemes can be designed cost-effectively with higher irrigation efficiency and enhanced water productivity of crops • Furrow irrigation and planting on Laser leveled beds can improve cropping intensity and water productivity by eliminating conveyance and application losses and improving water uniformity • Additional area under irrigation can be brought through adoption of drip irrigation systems	• Lack of awareness and motivation of public-sector institutions regarding objective of irrigation as livelihood generation – lack of coordination between Irrigation and Agriculture Departments • Lack of ownership among communities to take over O&M of surface irrigation schemes • Lack of enforcement for recovery of capital and operational cost for irrigation water • Areas are not fully recovered from militancy and any future military action would affect the investment. • Resistance from engineers of public sector institutions for adopting integrated strategy for enhanced productivity of irrigated agriculture

2-2-2-2 SUB-SECTOR: IRRIGATION SCHEMES - PERENNIAL GROUNDWATER

Around 50-100% area of all of the *tehsils* is irrigated by perennial groundwater irrigation schemes and these schemes provide water for year-round cropping. The productivity and sustainability of these schemes can be improved as the current productivity of various crops can be doubled with the

adoption of best practices. The groundwater is at premium and the ecology is suitable for high value deciduous fruits, nuts and vegetables, therefore high-efficiency and high-value agriculture practices can be adopted as a policy. It may be noted that any wasteful use of tubewell water is not only loss of water but it is also a loss of electricity or diesel fuel, especially in the Wana administrative unit. Ultimately, the water users of Wana have to bear the burden of the subsidy and end up paying the full tariff for electricity. The deep groundwater schemes are largely located in Wana and few in Ladha *tehsils*. The spring water is used in almost all the *tehsils* except in the Wana Tehsil.

Investment Options for Perennial Groundwater Irrigation Schemes

The suggested investment options are:

- Re-habilitation of damaged perennial groundwater irrigation schemes (springs, well and tubewells) through improvement of water conveyance using PE/PVC pipes and links from farm to metaled roads
- Provision of services to farmers for laser leveling of fields through provision of Laser Levelers to local Tractor Rental Companies along with capacity building of operators
- Linkages with private sector enterprises for provision of quality inputs to the water users – seed, fertilizers, pesticides, machinery, etc.
- Furrow irrigation and planting on laser leveled beds for improving water productivity in schemes using spring water.
- Drip irrigation for fruit plants and creeper-type vegetables for improving water productivity – a culture of drip farming have to be introduced
- Sprinkler irrigation systems including centre-pivot fertigation systems for improving productivity of crops
- Provision of services from drip and/or sprinkler irrigation companies to provide after-sale services and production technologies for enhancing water productivity leading towards high-efficiency and high-value agriculture

SWOT analysis of perennial groundwater irrigation schemes is provided below.

Strengths	**Weakness**
• Perennial groundwater irrigation systems through springs, wells and tubewells provide demand based availability of water for high value fruits and vegetables • Provides water during droughts to meet shortfall in rainfall and/or surface water • Managed groundwater schemes individually having minimal or no conflicts on distribution of water • Generate new livelihoods for unemployed youths in areas where potential is available for further development of groundwater • Topography of the SWA and snowfall in mountainous regions provides opportunity to recharge groundwater through integrated management of rainwater, runoff and floodwater	• Technical and knowledge support is not provided to farmers for the design, installation and operation of groundwater schemes covering springs, wells and tubewells • Provision of free electricity resulted in wasteful use of scarce groundwater • Groundwater abstraction in dry and average year is more than recharge in areas having deep tubewells i.e. Wana and Ladha • Groundwater abstraction exceeds recharge in dry years in areas having deep tubewells i.e. Wana and Ladha • Inefficient delivery and application of water, even the groundwater is at premium including energy inefficient pumping system and water conveyance losses
Opportunities	**Threats**
• Perennial groundwater irrigation schemes (springs, wells and tubewells) can be designed cost-effectively with higher irrigation efficiency and enhanced water productivity • Pipe-flow water conveyance irrigation system using PE/PVC pipes can eliminate water conveyance losses and reduce O&M cost • Furrow irrigation and planting on laser leveled beds, drip and sprinkler irrigation systems can improve cropping intensity and enhance water productivity by eliminating water conveyance and application losses and improved water uniformity	• Availability of free electricity for further development of wells and tubewells is going to increase burden on the FATA Government and would result in wasteful use of scarce and finite water resources • Inefficient pumping systems both in terms of water and energy efficiency – increased burden on provision of free electricity • Future increase in groundwater abstractions would deteriorate the situation of lowering of water table and mining of groundwater in areas where deep tubewells are installed i.e. Wana and Ladha

	• Non-sustainability of groundwater irrigation schemes until and unless groundwater is considered in the context of a trust and trusteeship is needed

2-2-2-3 SUB-SECTOR: IRRIGATION SCHEMES – SPATE IRRIGATION

Around 5-15% area of all the *tehsils* except Birmal is irrigated by Spate irrigation schemes through diverting floodwater and these schemes are providing water for one-season cropping. The productivity and sustainability of these schemes can be improved as the current productivity of various crops can be doubled with the adoption of best practices. These schemes are largely located in Ladha and Serwekai administrative units and Wana Tehsil. Farmers are hardly provided any support for cost-effective and sustainable design of Spate irrigation schemes. Most of the floodwater is ultimately drained into the Gomal and Tank Zams as very little attention has been given for the development and management of Spate irrigation. The sustainability of investment in Gomal Zam Dam project would depend on how the water users of SWA have been provided support for livelihood generation to have win-win situation for both the SWA and FRs (D. I. Khan, Tank and Lakki) and the settled areas of D. I. Khan and Tank districts.

Investment Options for Spate Irrigation Schemes

The suggested investment options are:

- Re-habilitation of damaged Spate irrigation schemes through improvement of diversion structures; watercourse conveyance and control; and links from farm to metaled roads
- Provision of services to farmers for bunding and leveling of fields through provision of Levelers to the local Tractor Rental Companies along with capacity building of operators
- Linkages with the private sector enterprises for provision of quality inputs to water users – seed, fertilizers, pesticides, machinery, etc.
- Construction of small dams and ponds for stockwater and for agriculture to meet shortfall
- Furrow irrigation and planting on leveled beds for improving water productivity.

SWOT analysis for Spate irrigation schemes is provided below.

Strengths	**Weakness**
• Floodwater originated from the hill-torrents is the largest resource of water available in SWA considering the water budget • There is an ample potential for further development of Spate irrigation schemes for achieving food security in the SWA • Adequate and relevant experience is available in KPK for participatory Spate irrigation systems – Rod-Kohi farming in D. I. Khan is the country's best irrigation system under five major Zams. Two Zams fall in the SWA – Gomal and Tank Zams • Cost-effective both in capital and O&M if effectively managed • Spate irrigation schemes can be designed and operated as gravity-flow schemes, hence no energy requirement for pumping of water • Storage of excess water is possible in small reservoirs to mitigate the impacts of floods and droughts • Spate irrigation when integrated with watershed management and rain/snow harvesting will contribute to groundwater recharge	• Current designing procedures for Spate irrigation in SWA are having in-built weaknesses where rights of downstream users' and Spate irrigation integration with flood control schemes are not considered • Spate irrigation schemes are designed to control flood and divert it rather than extending benefits to the Spate farmers through integrated use of stored and spilled water • Water conveyance and water productivity at farm level are not the design objective • No consideration is given for storage of excess water including the tail-end reaches and recharge of groundwater • Low priority assigned to Spate irrigation system and livelihood generation, even floodwater is the largest resource of water in SWA and it can also be used for recharging groundwater
Opportunities	**Threats**
• Future Spate irrigation schemes can be designed with higher irrigation efficiency, increased	• Lack of ownership among water users and rural communities to take over the responsibility of

command area and enhanced water productivity to achieve food security in the SWA • Local knowledge and practices can be integrated with water storage and recharge to distribute benefits to larger population • SWA ecology is suitable for wheat, oilseeds, coarse grains and pulses to reduce burden of imports of these commodities from Pakistan and generate new livelihoods for the unemployed • Provides opportunity for sustainable livelihood schemes rather than converting to small dams which are going to be silted up in 10-20 years, whereas Spate irrigation has been in practice since millenniums	O&M of Spate irrigation schemes • Water users are hardly involved in the planning process of new irrigation schemes or rehabilitation of existing schemes • Lack of enforcement for recovery of investment and operational cost for irrigation water – water fee • Lack of awareness and motivation of public-sector institutions regarding objective of Spate irrigation as livelihood generation instead of merely constructing flood control structures or dams • Resistance is common from engineers of public sector institutions for adopting integrated strategy for development of Spate irrigation, water storage and groundwater recharge with an objective to provide sustainable livelihood

2-2-2-4 SUB-SECTOR: RAINWATER/SNOW HARVESTING & WATERSHED MANAGEMENT

Around 6-26% area of all the *tehsils*, except Birmal, are meeting their water requirement from rainwater and runoff from adjacent slopes. The dry farming systems are mostly located in the mountainous and sub-mountainous regions, which also provide recharge for groundwater – springs and aquifer. There is a potential for developing mountainous and sub-mountainous regions differently for high-value arid horticulture. The climate of the SWA is extremely suitable for high value nut fruits i.e. Chalghoza, walnut, pistachio, fig, pomegranate and almond. Therefore, rainwater and snow harvesting techniques have to be adopted for storage of water in situ using micro-catchments and small reservoirs for the dry season. The stored water can be used for supplemental irrigation.

The beauty of these schemes is that either existing groundwater aquifers can be recharged or new aquifers can be created to provide new livelihood to the un-employed youth who is currently involved in smuggling or any other unproductive activity.

This option should be given the highest priority as vast area of the SWA can be brought under these interventions. The current natural vegetation and surface cover is a clear indication that in areas having snowfall and better rainfall can be regarded as high potential areas for development of new livelihood and larger farm sizes (i.e. 25 to 100 ha). This size of farm would tempt the youth to enter into agriculture as a source of livelihood.

Investment Options for Rainwater/Snow Harvesting and Watershed Management

The suggested investment options are:

- Re-habilitation of damaged bunds and fields of Barani farming through improvement of earthen bunds, leveling of fields, and rehabilitation of water ponds and reservoirs and links from farm to metaled roads
- Provision of services to farmers for terracing and leveling of fields through provision of Levelers and front-mounted tractor blades to the local Tractor Rental Companies along with capacity building of operators
- Linkages with private sector enterprises for provision of quality inputs to water users – seed, plants, fertilizers, pesticides, machinery, etc.
- Construction of micro-catchments for rainwater and snow harvesting and water storage ponds for stockwater and for fruit plants to meet shortfall in the dry years.
- Furrow-bed planting on leveled fields for improving water productivity.
- Development of deciduous fruit and multipurpose forest tree nurseries in the private sector
- Plantation of nut and fruit trees (chalghoza pine, walnut, pistachio, olive, fig, etc.) in micro-catchments

- Watershed management to reduce erosion of top soil, improving surface cover through plantation of multi-purpose trees and grasses

SWOT analysis for Rainwater/Snow Harvesting and Watershed Management is provided below.

Strengths	Weakness
• Rainwater and snow are the two natural sources of water which support human life and agriculture in SWA and vast area can be brought under forestry, range and pastures and arid horticulture using nut fruits • As rainwater and snow is provided by nature and it is well distributed over the mountainous and sub-mountainous regions therefore Barani farming systems supplemented by harvested water or runoff can provide the most cost-effective system of generating new livelihoods • There is an ample potential for further development of Barani farming and watershed management • Watershed management in the upstream areas would support the sustainability of irrigated agriculture systems in the SWA • Adequate and relevant experience is available in KPK and Punjab for participatory Barani farming and watershed management systems • Cost-effective both in investment and O&M if effectively managed • Storage of excess water is possible in small ponds for multiple uses and to mitigate the impacts of floods and droughts	• Current designing procedures for rainwater/snow harvesting and watershed management have in-built weaknesses where no support is provided to the youth for developing new livelihoods – a shift in policy is needed • Barani farming systems are designed for crops with low water requirements and no attention is given to plant nut fruits of high value like almonds, pistachio, chalghoza, etc. • Rainwater/snow harvesting at farm and sub-watershed level are not the design objective. • No consideration is given for storage of excess water for multiple uses including domestic and stockwater • Low priority assigned to Barani farming and watersheds, even most of the land is suitable for water harvesting and watershed management to develop plantation economy
Opportunities	**Threats**
• Future Barani farming and watershed management schemes can be designed with higher productivity and profitability to achieve food security in the SWA and to provide new livelihood to the unemployed youth • Local knowledge and practices can be integrated with rainwater/snow harvesting, water storage, recharge to groundwater and plantation of deciduous nut fruits to distribute benefits to larger population • SWA ecology is suitable for plantation of deciduous nut fruits and forest plantations for export to Pakistan the value added nuts, timber and fuelwood • Provides opportunity for sustainable livelihood schemes which are larger in size so that an economical farming system can be developed for the unemployed youth as a respectable livelihood rather better option than smuggling and growing opium.	• Water harvesting and watershed management for traditional Barani farming systems is not economical and new model has to be developed to encourage the unemployed youth to initiate large scale farming for sustainable livelihood • Lack of motivation among the notables and political leaders and the FATA public-sector institutions to link Barani farming to sustainable livelihood with high value deciduous fruits, nuts, forest plantations for timber and fuelwood and livestock • Watershed users are hardly involved in the planning process of new schemes or rehabilitation of existing schemes • Lack of security due to isolated rugged and mountainous topography and areas bordering with Afghanistan • Lack of awareness and motivation of public-sector institutions regarding objective of rainwater/snow harvesting and watershed management • Resistance is common from engineers and agriculture experts of public sector

	institutions for adopting integrated strategy for development of Barani farming and watershed management as a source of livelihood

2-2-3 SUB-SECTOR: PRIVATE SECTOR DEVELOPMENT

The interventions for private sector development are included as a cross-cutting theme for both water and agriculture sectors. The private sector development interventions are presented as a separate sub-sector to suggest a higher priority:

- Provision of services to farmers for laser leveling of fields through provision of Laser Levelers to the local Tractor Rental Companies along with capacity building of operators
- Provision of services from drip and/or sprinkler irrigation companies to provide after-sale services and production technologies for enhancing water productivity leading towards high-efficiency and high-value agriculture
- Provision of services to farmers for bunding and leveling of fields through provision of Levelers and front-mounted tractor blades to the local Tractor Rental Companies along with capacity building of operators
- Linkages with private sector enterprises for provision of quality inputs to water users – seed, plants, fertilizers, pesticides, machinery, etc.
- Development of deciduous fruit and multipurpose forest tree nurseries in the private sector

2-3 AGENCY DEVELOPMENT PLANS FOR WATER

2-3-1 INVESTMENT OPTIONS FOR WATER

Investments for SWA Development Plans for water sector are presented in **Table 2-3-1.**

TABLE 2-3-1: SUMMARY OF INVESTMENT OPTIONS FOR WATER

No.	Sub-Division	Priority Action Area	Cost (US$ in million)
1	**Ladha**	Water Resources Monitoring and Data Collection Networks in Tank River basin	0.50
		Water Supply and Sanitation	4.0
		Minor Perennial Surface Irrigation Schemes including Small dams in the Tank River basin (3 Schemes)	6.0
		Perennial Groundwater Irrigation Schemes	6.0
		Spate Irrigation Schemes including Small dams in Tank River basin (4 Schemes)	8.0
		Rainwater/Snow Harvesting and Watershed Management in the Tank River basin	3.0
		Private-sector Service Operators for Irrigation and Land development	1.00
		Private Sector Input Supply Enterprises – Partnership of Local Enterprises with National and Multinational Supply Companies – Seed, fertilizers, chemicals, etc.	0.50
Total Cost for Ladha Sub-Division			**29.00**
2	**Serwekai**	Water Resources Monitoring and Data Collection Networks in Tank River basin	0.50
		Water Supply and Sanitation	4.0
		Minor Perennial Surface Irrigation Schemes including Small Dams in Tank River basin (3 Schemes)	6.0
		Perennial Groundwater Irrigation Schemes	6.0
		Spate Irrigation Schemes including Small Dams in Tank River basin (3 Schemes)	6.0
		Rainwater/Snow Harvesting and Watershed Management in Tank River basin	3.0
		Private-sector Service Operators for Irrigation and Land Development	1.00
		Private-sector Input Supply Enterprises – Partnership of Local Enterprises with National and Multinational Supply Companies - Seed, fertilizers, chemicals, etc.	0.50
Total Cost for Serwekai Sub-Division			**27.00**
3	**Wana**	Water Resources Monitoring and Data Collection Networks in Gomal River basin	1.00
		Water Supply and Sanitation	7.0
		Minor Perennial Surface Irrigation Schemes including Small Dams in Gomal River basin (4 Schemes)	8.0
		Perennial Groundwater Irrigation Schemes	8.0
		Spate Irrigation Schemes including Small Dams in Gomal River basin (7 Schemes)	14.0
		Rainwater/Snow Harvesting and Watershed Management in Gomal River basin	3.0

No.	Sub-Division	Priority Action Area	Cost (US$ in million)
		Gomal Zam Dam Watershed Management, Periphery High Efficiency Farming and Reservoir Fisheries *(linkage with USAID Gomal Zam Dam Command Area Development Project)*	4.0
		Private-sector Service Operators for Irrigation and Land Development	2.0
		Private-sector Input Supply Enterprises – Partnership of Local Enterprises with National and Multinational Supply Companies - Seed, fertilizers, chemicals, etc.	1.0
Total Cost for Wana Sub-Division			**44.00**
Total Cost (US$ in million)			**104.00**

Recommendations for implementation

The concept of three administrative units of SWA also provides an opportunity to select the three main *tehsils* of Ladha, Serwekai and Wana as entry-points to initiate implementation of ADP water sector activities. After rehabilitation and reconstruction works in the entry *tehsils*, investments would be expanded to areas outside the three main *tehsils* and within each region. Although the administrative boundaries are suggested as Target Areas for the implementation of the ADP, however, for sustainable water sector development purposes interventions can be implemented considering watershed as a basin.

Within the suggested Target Areas comprising of the three administrative units priority will be given to schemes where investments have already been made. For instance, the most significant example here is the Gomal Zam dam where watershed and reservoir fall in the SWA and thus interventions regarding watershed management, reservoir periphery's fruit plantations on drip irrigation, reservoir fisheries would be given higher priority. These interventions will bring sustainability to the overall large investments made in the Gomal Zam dam projects. Similarly, for interventions related to livelihood generation in irrigation schemes close partnerships will be developed with USAID-financed projects of Gomal Zam dam's Command Area Development, FATA Infrastructure Project (FIP), etc. For equitable distribution of benefits of the project across all three administrative units all the Zams including Tank Zam schemes will be linked with FIP and future USAID programs. For this purpose specific schemes will be developed and implemented with active partnership of private sector so that these schemes survive even after the completion of the project.

3 AGRICULTURE
3-1 AGRICULTURE SECTOR OVERVIEW

3-1-1 CURRENT STATUS

Agriculture is the largest sector of the economy and serves as the backbone of the rural economy in Pakistan. Likewise, the importance of agriculture in FATA's context can be gauged from the fact that over 90% of the population derives their livelihoods, directly or indirectly, from this sector. It serves as a lifeline for the people of FATA and a pillar of the tribal economy. Small landholders who make up the majority of farmers practice agriculture mainly at the subsistence level. Farming practices here are characterized by underutilization of land and prevalence of risk-averse behaviors such as the cultivation of low input crops. Critical aspects of agriculture as they relate to SWA Agency are discussed next which include: land; crops; horticulture; and, livestock.

3-1-2 LAND UTILIZATION

Of the total area of 2.7 million hectares in FATA only eight percent is used for cultivation. SWA encompasses around 662,000 hectares, which is 24 percent of the total FATA area, making it the largest agency. Of this, only three percent of the area is cultivated and the remaining area is uncultivated (Table 3-1). Culturable wasteland in SWA is 46,513 hectares and there is great potential of crop productivity improvement if this land were to be reclaimed and utilized for agriculture purposes. The land holdings are small, fragmented and average two acres per household. This situation underscores the need to place increasing emphasis on intensive cultivation through introduction of high value crops.

TABLE 3-1: LAND UTILIZATION IN SWA AGENCY FATA 2009-10 (Hectares)

Agencies	Reported Area (8+3)	Cultivated Area			Cropped Area		Un-Cultivated Area			
		Total (4+5)	Net Sown	Current Fallow	Total (4+7)	Area sown more than once	Total (9+10+11)	Culturable Waste	Forest Area	Not Available for Cultivation
1	2	3	4	5	6	7	8	9	10	11
FATA	2,722,042	221,015	156,348	64,667	196,589	40,241	2,501,027	168,171	52,064	2,280,792
SWA	662,000	18,040	15,392	2,648	21,838	6,446	643,960	46,513	1,690	595,757

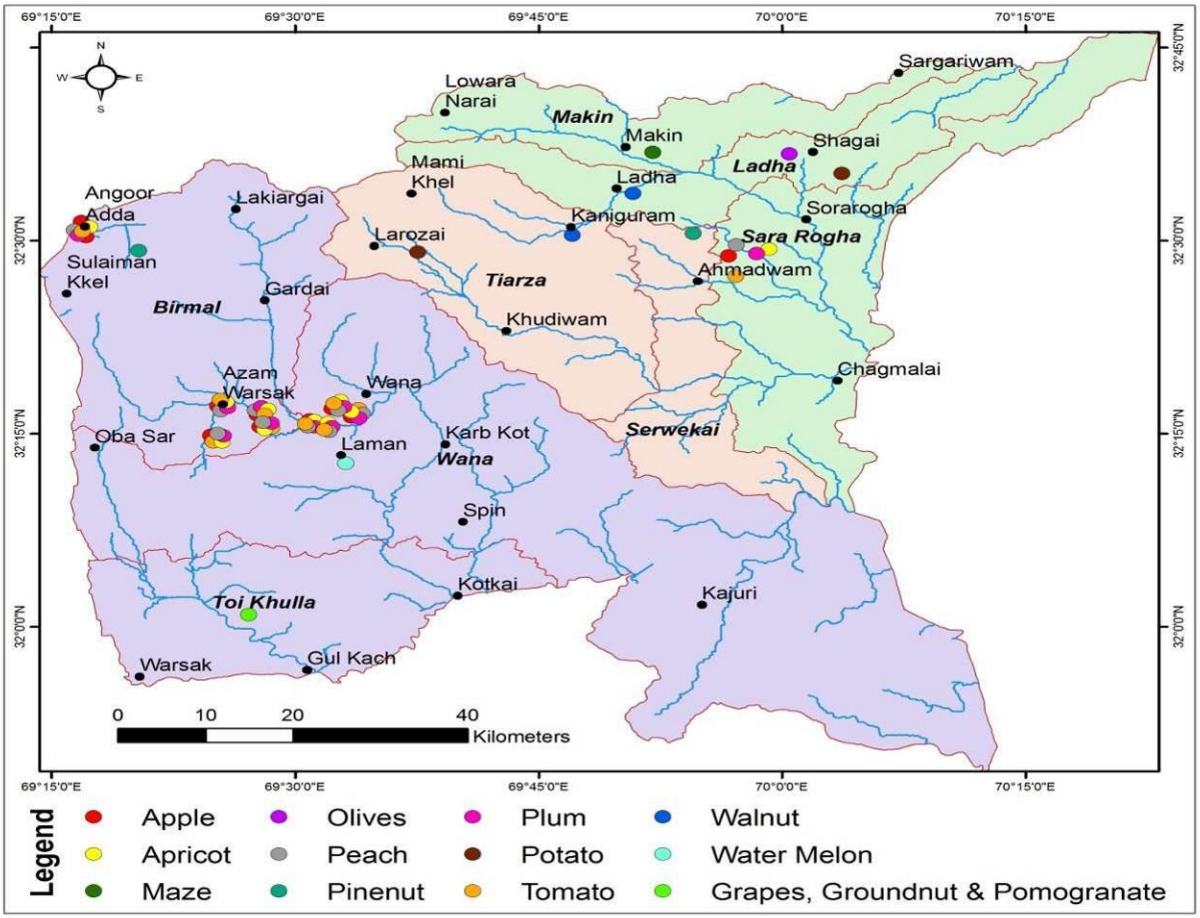
Source: - FATA Agriculture Statistics 2009-10 Crop Reporting Cell in Directorate of Agriculture Extension FATA Peshawar.

SWA's area consists of rugged rocky terrain with several peaks over 8,000 feet. Arable land is in short supply, so narrow valleys are intensively farmed. The major plains are Wana, Zarmilan, Spin and Barwan of which the Wana is the richest in ground and surface water potential. The total irrigated area in SWA is less than the other agencies except Orakzai Agency. The major part of the land is covered with rangelands and rocky mountain followed by forests, irrigated agriculture and water bodies.

3-1-3 CEREAL CROPS

The soil and climatic conditions favor cultivation of cereals, fruit and vegetables but agricultural productivity remains low. The majority of the cropped area is planted with cereals which is a clear indication of the households' food security priorities. Many farmers, especially in the rain fed area, are subsistence producers. The food grains they produce only meet family food requirements for five to six months. For the reminder of the year, the farmers buy grain by selling livestock, or, from off farm income. The cropping system consists of different kinds of crops produced on both rain fed and irrigated land in SWA. The major cereal crops grown are wheat and maize and are shown in Figure 3-1. SWA accounts for 19% of FATA's maize production. Makin and Ladha are the major maize growing areas whereas wheat is mostly grown in Serwekai and Wana Administrative units.

FIGURE 3-1: MAIN CROPS CONCENTRATION IN MAJOR AREAS OF SWA



Source: Agriculture Extension staff and farmers

Yield per hectare is comparatively higher than other agencies which indicate that climatically the area is suitable for further development. The average yield of wheat is less than the other agencies. The reasons could be access to quality seed and improved technology, etc. Details of production and yield per hectare of maize and wheat are presented in the Table 3-2.

TABLE 3-2: AREAS & PRODUCTION OF WHEAT & MAIZE INSWA-FATA 2009-10

Agency	Maize			Wheat		
	Total Area (Hectares)	Total Production (Tones)	Yield per Hectare (Kg)	Total Area (Hectares)	Total Production (Tones)	Yield per Hectare (Kg)
FATA	36,052	52,193	1,448	100,752	126,227	1,253
SWA	6,675	10,413	1,560	7,280	7,623	1,047
SWA (% of total)	19%	20%		7%	6%	

Source: - FATA Agriculture Statistics 2009-10 Crop Reporting Cell in Directorate of Agriculture Extension FATA Peshawar.

3-1-4 HORTICULTURE (FRUIT)

Horticulture includes vegetables, fruits, and flowers and it is an important sub sector of agriculture. Crop production in FATA is mainly subsistence driven. However, there are farm households that are engaged in commercial level production of specific fruits. Table 3--3 (below) shows that SWA is the leading area in FATA for fruit production. In 2009-10 a total of 70,043 tons of Kharif fruits were produced in SWA that represented 76% of the total production of FATA Kharif fruit. SWA produced 63,880 tons of apples contributed 91% share of FATA's total fruit production.

Pine nuts are an expensive product which are sold at high prices in local and export markets. The product is considered to be a specialty since it is not abundantly grown. Most of the production of pine nuts is in Birmil and Angoor Adda areas of Wana Administrative unit. Other commercial fruits, such as apple, peaches, apricots, plums, and water melons and pine nuts are mainly produced in Wana Administrative unit and walnuts in Ladha and Serwekai Administrative units. Grapes, ground nuts and pomegranates are produced in Toi Khula areas of Wana Administrative unit. While crops are grown on a commercial scale in these areas the return to farmers is low because of: poor quality of inputs; weak market information and perishability of fruits; weak transportation; limited skills in post-harvest handling, etc.

TABLE 3-3: AREAS AND PRODUCTION OF FRUITS IN SWA AGENCY (2009-10)

Agency	Total		Total Kharif Fruits		Total Rabi Fruits	
	Area (Hectares)	Production (Tones)	Area	Production	Area	Production
FATA	8,438	98,794	7,363	92,277	1,075	6,517
SWA	5,430 (64%)	70,043 (71%)	5,430	70,043 (76%)	0	0

Source: - FATA Agriculture Statistics 2009-10 Crop Reporting Cell in Directorate of Agriculture Extension FATA Peshawar.

3-1-5 HORTICULTURE (VEGETABLES)

SWA is the main growing area of FATA in case of vegetable production and marketing. During 2009-10, total production of vegetables in the agency was 11,372 tons, which was 19% of total

FATA production. Different types of seasonal vegetables are produced in the agency. In SWA, tomato, ladyfinger, radish, bottle gourd, bitter gourd, and potato are the major vegetables grown on a commercial scale and are grown in Wana administrative unit. The main vegetable growing areas in Wana are Dab Kot, Azam Warsak, and Shin Warsak. Potatoes are grown on a commercial scale in Shakai and Mughal Khail areas of Administrative unit Ladha. Tomatoes are produced mostly in Wazir areas.

TABLE 3-4: AREAS & PRODUCTION OF VEGETABLES IN SWA-FATA 2009-10

Agency	Total		Total Kharif Vegetables[14]		Total Rabi Vegetables[15]	
	Area (Hectares)	Production (Tones)	Area	Production	Area	Production
FATA	8,455	58,777	5,345	33,521	3,110	25,256
SWA	1,790 (21%)	11,372 (19%)	1,654	10,522	136	850

Source: - FATA Agriculture Statistics 2009-10 Crop Reporting Cell in Directorate of Agriculture Extension FATA Peshawar.

3-1-6 LIVESTOCK& POULTRY

FATA is endowed with a large and diverse range of indigenous breeds of sheep, goats and cattle. These animals directly contribute to the socio-economic conditions of these households and around 90% of the farmers' rear livestock. In rain-fed (barani) areas there are more cows as they can be grazed and thus require less extra feed. According to the livestock census of 2006 (Table 3-5), the number of cattle in FATA stands at 1.4 million of which 0.13 million are in SWA. It is important to note here that these are pre-conflict figures and the expectation is that current figures for livestock in SWA would be significantly lower.

TABLE 3-5: LIVESTOCK IN SWA AGENCY- FATA 2006

S. #	Type of animals	FATA	SWA Agency	
		Numbers	Numbers	%
1	Cattle	1,429,609	134,611	9
2	Buffaloes	124,881	14,677	12
3	Sheep	1,531,083	313,639	20
4	Goats	3,252,694	399,137	12
Total		**6,338,267**	**862,064**	

Source: - Pakistan Census of Livestock, 2006

Landless sheep/goat herders are also an important part of the livestock sub sector. In FATA, goats and sheep are the dominant species of livestock. On average, each household raises two to three goats of low quality and nondescript breed. Natural breeding is common in small ruminants, but the local breeds do not always have the most desirable production traits.

Animals graze on waste and fallow land while some are stall-fed. Grazing normally takes place on common lands (*shamilat*), where wood extraction is also permitted but no construction of any kind is allowed. Ownership of livestock is individual, governed by tribal law, especially when it comes to grazing. In FATA, cereal crops like wheat, barley, rice and maize are produced both as

[14] Kharif season means the sowing season of which begins in April - June and harvesting during Oct-December

[15] Rabi which begins in October – December and ends in April - May

grain for flour and as fodder/crop residues for animal feed. Fodder crops are important for livestock feed and are often produced in rotation with cereals. Mixtures of grasses and legumes make good dry fodder for winter. Cattle are fed both on rangelands and in sheds. In winter, all livestock are fed indoors and rely on crop residues and stored fodder. Because of very limited land holdings, a shortage of water and extreme weather conditions fodder crop cultivation is limited. As a result, traditionally there is a fodder deficit from November to March, when the main summer fodder crop season for maize is over.

In FATA, household poultry rearing has a major role in traditional tribal hospitality for outside guests and is also an income generating activity particularly for women and landless people. In SWA, there is great demand for eggs and meat which are mainly supplied from the settled areas. Due to insurgency especially in Ladha and Serwekai administrative units, all the facilities related to poultry were destroyed. Poultry farmers here face a number of issues relate to: layer and broiler farm management; diseases; knowledge about good breeds; feed; and, marketing skills. Moreover, vet professionals in FATA have limited knowledge about poultry management.

3-1-7 INSTITUTIONAL FRAMEWORK

Provided below is information with regards to the institutional framework for agriculture:

PRIVATE SECTOR INSTITUTIONS

The private sector institutions plays a major role in agriculture and examples of private sector stakeholders are: market commission agents; pesticides, fertilizer & seed companies; credit providers; departmental stores; supporting institutions (dairy companies); and, civil society institutions.

PUBLIC-PRIVATE PARTNERSHIPS

Examples of Public-Private Partnership are Farm Services Centers (FSCs), Livestock Dairy Development Board, Horticulture Development Board, Pakistan Agriculture Storage & Services Corporation (PASSCO) and Agriculture Marketing & Storage Limited (AMSL) etc.

PUBLIC INSTITUTIONS

All type of government planning, coordination and implementation is under the umbrella of FATA Secretariat headquartered in Peshawar and headed by an Additional Chief Secretary (ACS). Provided below is information about the key government departments:

- **Department of Agriculture Extension:** This Department is headed by a Director and its main functions are dissemination of recommended agricultural practices, training of farmers in improving agricultural production technology and regulatory measures for agriculture input/output.

- **Department of Agriculture Research:** This Department is responsible for all agriculture-related research activities in FATA.

- **Department of Livestock & Dairy Development:** This Department focuses on prevention and cure of diseases, breed stock improvement and nutrition of animals. There are Veterinary Hospitals, Dispensaries and Centers in SWA.

3-1-8 REGULATORY FRAMEWORK

In 2009, FATA Horticulture Policy was approved by the Additional Chief Secretary FATA Secretariat. Also, the President of Pakistan through a notification dated 28th of August 2012 extended the following laws to FATA: Agricultural Produce and General Grading Act 1937; the Seed Act, 1976; Agricultural Pesticides Ordinance, 1971; and, Pakistan Environmental Protection Act 1997. Some of these policies are discussed briefly below:

- **FATA HORTICULTURE POLICY**: FATA Horticulture Policy was approved by the Government in 2009 and provides for: private sector to play an active role in seed and nursery plant production and marketing.
- **SEED ACT (1976):** This Act provides for quality control through registration of crop varieties, crop inspection and seed testing.
- **AGRICULTURAL PESTICIDE ORDINANCE (1971) & RULES (1973):** These Acts regulate import, manufacture, formulation, sale, distribution, use, and advertisement of pesticides.
- **AGRICULTURAL PRODUCES (GRADING AND MARKETING) ACT 1937 & AGRICULTURAL PRODUCE (MARKETS) ACT 1939:** The first Act is a Federal Act and relates to the grading and standardization of the agricultural produce while the latter is a Provincial Act which provides for the regulation of agricultural wholesale markets.

3-1-9 GOP'S DEVELOPMENT STRATEGY

To bring FATA in the mainstream Pakistani society, FATA Secretariat prepared a document "*FATA SUSTAINABLE DEVELOPMENT PLAN (SDP) 2007-15"*To turn this vision into reality the SDP outlines a broad range of interventions geared towards development of the agriculture and livestock sectors.

3-1-10 DONOR ASSISTANCE PROGRAM AND STRATEGIES

Some of the major donors are actively pursuing agriculture and livestock development programs in SWA. Donors like USAID and UN have a long term agenda to support community and Government institutions in the tribal areas and emergency relief support. Provided below is a list of Donor's assisting development program in SWA is:

1. Pakistan Transition Initiatives (PTI) (FATA Secretariat Special Program - FSSP) funded by USAID,
2. FATA Institutional Strengthening Program (FISP) funded by USAID,
3. FIP by USAID in SWA,
4. Food & Agriculture Organization of UN chairing the livelihood cluster in KPK and FATA,
5. The Agribusiness Project funded by USAID and implemented by Agribusiness Support Fund.
6. The RLCIP for FATA by the World Bank through Multi Donor Trust Fund (MDTF)
7. UNDP and UN-OCHA are funding for livelihood activities engaging local NGOs like PRDS etc.

3-2 AGRICULTURE OPPORTUNITY ASSESSMENT

SUB SECTOR SELECTION

Agriculture/farm sector consists of crops (cereal crops and horticulture), livestock, agro forestry and aquaculture. On-farm and off-farm sectors are the two essential elements of the rural economy. Although off-farm activities are increasing in relative size and significance as employer of labor force in the rural economy, agriculture remains the driver of growth. Provided in this chapter is an assessment of the following three agriculture sub-sectors: cereal crops; horticulture; and, livestock and poultry.

3-2-1 SECTOR-WIDE INTERVENTIONS

MARKET POTENTIAL

Discussed here are interventions that are necessary for overall development of the agriculture sector. These interventions try and address key obstacles that hinder development of the agriculture sector in FATA.

STRENGTHENING/FORMATION OF FARM SERVICES CENTERS (FSCs)

Farm Services Center (FSC) is a joint venture between the government and community with a mandate to provide quality inputs to its members on a timely basis at a comparatively lower price than the prevailing market price. The government provides matching grants as a revolving fund for the purchase of inputs by the FSCs. Currently two FSCs exist, one at Wana and the other at Serwekai. Wana FSC is in working condition while Serwekai FSC was demolished during an operation. The FSCs are meant to serve as a credible organization that can supply inputs in bulk at the local level. However, in general, FSCs are not achieving their desired objectives due to certain institutional and operational issues.[16]

Farmer's groups could be organized in three administrative units of SWA for the purchase and supply of inputs. Here, the groups can take advantage of the existing networks and established mechanisms of the FSCs. There is also an opportunity here to strengthen the capacity of members of existing FSCs for better services as well as to rehabilitate the existing two FSCs and

[16] Provided below are issues faced by the FSCs:

- FSCs decisions are taken jointly by the Department of Agriculture Extension and the community so they may not reflect the community's priorities.
- FSC management committee has limited knowledge about marketing/business and utilization of revolving funds.
- FSCs also face operational issues, such as, unsatisfactory management and record keeping skills, weak market linkages, etc.

In order to make the FSCs more effective and efficient, provided below are some recommendations for interventions that may be considered:

- Ensure decisions taken by FSC are truly representative of the needs and priorities of the local communities.
- Provide capacity building support to FSC management committees so they better deal with overcoming operational issues.
- Enable FSC to have access to quality inputs and modern technology by establishing linkages with private sector businesses, such as, seed companies, processing units, drip irrigation technology companies, etc.

establish further new FSCs in each SWA Tehsil. Farm mechanization could be another option to improve service delivery system and enhance crop productivity through FSCs in SWA.

FORMATION/STRENGTHENING PRODUCERS' ASSOCIATIONS

The majority of farmers in SWA sell their produce to markets and purchase inputs by themselves. They face a broad range of problems, such as: selling their produce at a low price; unawareness about potential markets for their products; high transportation costs; lack of credit facilities, etc. Formation of commodity-based associations under the umbrella of FSCs and technical supervision of the Agriculture and Livestock Department could be a viable option to address a number of the issues mentioned here. Associations could facilitate commodity sales, provide storage, create links with credit facilities, provide access to national and international market, etc. Associations could also link their members with service providers for technical assistance in adopting new improved techniques in crops and livestock. The Associations could be formed from the existing FSCs (Wana and Serwekai) for key commodities e.g., an Apple Association, a Pine Nut Association, a Tomato Association, etc.

FARMER & STAFF TRAINING THROUGH FARMERS' FIELD SCHOOLS

Here, farmers would be trained in all aspects of livestock and horticulture production and management. The capacity of individual farmers would be strengthened to utilize genetically improved animals, nutrition and health practices and crop management at village level in each administrative unit. Under the Farmer Field School (FFS) Approach, a group of 20 to 25 farmers on one site would be trained by an external facilitator. The external facilitator could be a trained master trainer from Agriculture Extension department. Another option could be to outsource FFS program to an NGO[17] or private company that is experienced in training farmers. To strengthen the extension services, training and equipment could be provided to private Livestock Extension Workers (LEWs) who could deliver services on payment to farmers living in remote areas.

LAND RECLAMATION & IMPROVING SOIL FERTILITY

Much culturable wasteland is convertible to cultivable land through reclamation measures including leveling with bulldozers and graders, and leaching the soil if it is alkaline. Reclamation can cover removal of large stones, leveling and installation of bunds for irrigation. Soil restoration includes the application of manures, planting and plowing-in legume crops. The result of this intervention would be more land available for cultivation. With reclamation new opportunities could be opened for farmers to bring more land under irrigation using tube wells, river spurs, etc. High value crops such as off-season vegetables and fruits can be grown to increase the income per unit area. Short term jobs for family members and outside labors can also be created during this intervention e.g., for clearing the land[18] manually, etc.

[17] Cabi bio Science, UN-FAO, Inter-Cooperation, Agribusiness Support Fund have the experiences of facilitating FFS on crops in Pakistan

[18] About 278 hectare command area need leveling and reclamation under newly constructed Dargai Pal Dam in SWA.Similarly Gomal Zam Dam is a multi-purpose hydropower and irrigation project in SWA, DI Khan and Tank, and will provide more reliable downstream irrigation for 65,964 hectares in D.I. Khan and Tank, KPK, benefiting 30,000 households.

REHABILITATION OF GOVERNMENT/PRIVATE AGRICULTURE FACILITIES

Farm to market roads, markets and community based irrigation infrastructures are basic requirements for sustainable agriculture. Most of these requirements are covered in the Trade and Water chapters of this report. The Livestock Department of the FS conducted a damage assessment of livestock facilities in SWA and identified the following facilities as needing rehabilitation:

- Establishment of New Farm Services Centers at the *tehsil* level (two each in Wana and Serwekai and three in Ladha: Total 07)
- Rehabilitation of existing Farm Services Centers (one each at Wana and Serwekai: Total 02)
- Rehabilitation of Veterinary Hospitals. (one in Serwekai and two in Ladha: Total 03)
- Rehabilitation of Veterinary Dispensaries. (Total 13)
- Establishment of a soil, water and pesticides testing laboratory (one at Wana: Total 01)

RESOURCE REQUIREMENT

FINANCIAL

Estimates of financial resources required for developing the sectoral investment options are provided In Table 3-6 (Below).

TABLE 3-6: ESTIMATED COST OF INVESTMENT OPTIONS FOR SECTORAL INTERVENTIONS

S. #	Investment Option	Administrative unit in SWA	Quantity/No	Estimated cost	
				PKR (million)	USD (million)
1	Rehabilitation/formation of Farm Services Centers	Wana, Ladha & Serwekai	9	150	1.55
2	Strengthening of FSCs covering capacity building and farm machinery (list in Annex 3-1)	Wana, Ladha & Serwekai	9	150	1.55
3	Farmer's Field School (FFS) for Farmers & Staff Training	Wana, Ladha& Serwekai	300	150	1.55
4	Establish and Strengthening Producer Associations	Wana, Ladha & Serwekai	06	12	0.12
5	Land reclamation	Wana, Ladha & Serwekai	2023[19] hectares	180	1.86
6	Rehabilitation of Government Livestock Facilities(list in Annex 3-2)	Wana, Ladha& Serwekai	16	200	2.06
Total (conversion rate US $= PKR 97				**842**	**8.69**

3-2-2 SUB SECTOR: CEREAL CROPS

MARKET POTENTIAL

Cereal crops such as wheat and maize are the main staple grain crops best suited to the climate in SWA, especially in Ladha and Serwekai administrative units. For the development of this sub

[19]Details of costing in PKR per acre land leveling/reclamation includes 40 hours of tractor and bulldozer per acre @ Rs. 900 per hour= Rs. 180 million). Costing for each land leveling and reclamation could be varied depends on site situation. Rate of hour tractor varies season to season. In open market it is up to Rs. 1200 to 1500 per tractor hour.

sector, following interventions are proposed: increasing crop productivity; improving seed production; and, strengthening linkages with private seed companies.

INCREASING CROP PRODUCTIVITY

Yields of cereal crops, especially wheat and maize, can be increased with good agriculture practices such as distribution of genetically improved seed, compound fertilizer and the introduction of minimum tillage technology. An integrated approach (improved seed, fertilizer and minimum tillage technology) in SWA would have a higher return on investment in terms of production and income. Farmers should be supported with improved wheat and maize seed along with fertilizer and zero tillage machinery to utilize on their farms. This technology has already been tested[20] in FATA during last three years and a significant increase in yield was recorded. A key lesson learnt with this technology was that a combination of good agriculture practices and quality inputs (e.g., seeds, etc.) coupled with minimum tillage technology can achieve good results.

IMPROVING SEED PRODUCTION

An improved seed production program could be developed which involves self-wheat seed production by the farmers under the guidance of technical staff of Agriculture Extension Department. For this, Farmers' Associations or Farmers' Field Schools as outlined above could be organized in each Tehsil of Ladha, Serwekai and Wana and trained on seed production. Seed specialists from KPK Agricultural University Peshawar or any Research Institute could be the resource persons for capacity building of these seed growers. Linkages of these trained seed growers through FSC with other seed companies and dealers would be necessary to make this intervention sustainable. The establishment of a seed farm in SWA through the FSC under the technical supervision of Agricultural Extension services would serve to provide pre-basic and basic seed of cereals to farmers/members of Associations for further multiplication on their farm. This would reduce dependency on outside sources of seed and leads towards self-sufficiency and address food security.

RESOURCE REQUIREMENT

FINANCIAL

Estimates of financial resources required for developing the sub sector Cereal Crops are provided In Table 3-7 (Below).

TABLE 3-7: ESTIMATED COST OF INVESTMENT OPTIONS FOR SUB SECTOR CEREAL CROPS INTERVENTIONS

S. #	Investment Option	Administrative unit in SWA	Quantity/No	Estimated cost	
				PKR (million)	USD (million)
1	Increasing Crop Productivity with Good Agriculture Practices	Wana, Ladha & Serwekai	404,7 hectares	100	1.03
2	Seed Production	Wana, Ladha& Serwekai	809 hectares	20	0.21
3	Establishment of Seed Farm	Wana	One (81 hectares land)	200	2.06
Total (conversion rate US $ = PKR 97)				**320**	**3.3**

[20]USAID funded upper FATA Livelihood Development Program tested zero tillage technology in 2008-09 in Mohmand, Khyber and Bajaur Agencies

MARKETING

Much effort is needed on inputs supply and capacity building of seed producers and FSCs in marketing. Specifically these seed growers and FSCs should be linked with private seed companies, input dealers, and research organizations to know the whole chain of inputs (seed, fertilizer and pesticides). The Agriculture Research Institute Tarnab and DI Khan could provide pre basic seed to Agriculture Extension to multiply it on proposed seed farm. The basic seed produced on this seed farm could be further multiplied by progressive growers through FSC and for onward distribution among the members of Associations and FSCs for production purpose on their land.

SKILLS

Farmers need skills in seed production technology, using zero tillage machinery, grading and cleaning of seed and storing of seed without losing the viability of crop seed.

TECHNOLOGY

The technologies required for the development of this sub sector are: minimum tillage technology; seed farming and increasing soil fertility; and, seed production. Each of these is detailed in Annex 3-3.

INFRASTRUCTURE

Some of the off-farm investment opportunities in agriculture that are being proposed are in those areas which could be brought under power by the USAID-funded Gomal Zam Dam project in SWA. Similarly, supply chains for the proposed interventions and marketing of produce are directly linked with the road network established under the FATA Infrastructure Project funded by USAID in SWA. Farm to market roads, markets and community-based irrigation infrastructures are basic needs for the agriculture sector development and are covered in detail in the Trade and Water chapters of this report.

SWOT ANALYSIS

STRENGTHS	WEAKNESSES
▪ Land resources and ownership are available ▪ Manpower at low cost is available ▪ Prioritized by FATA Secretariat ▪ Diverse agro-ecosystems are available, with many land-types and cultivars ▪ Machinery available for land leveling. ▪ Experience in cereal crops cultivation ▪ Wheat, maize are the main staple crops and barley as fodder for animals ▪ Cereal crop straw as fodder	▪ Availability of quality seed in a range of varieties ▪ Scarcity of irrigation water. ▪ Farmers/extension workers have limited knowledge, access to technology, and skills ▪ Productivity of agricultural labor, land and water is low ▪ Basic infrastructure destroyed and/or damaged ▪ Poor resources for reclamation and inputs ▪ In time availability of inputs ▪ Small size of farms ▪ Reluctance of private sector for investment.
OPPORTUNITIES	**THREATS**
▪ Tested technology for crop productivity ▪ Land reclamation & protection bund/spurs for maximization of crop production	▪ Political administration ban fertilizer use in any crop including maize crop ▪ Degradation of the environment due to floods

▪ Wheat seed production by seed growers ▪ Establishing laboratories to test soil status ▪ Linkages private seed companies & dealers ▪ Private sector's investment in land leveling and seed ▪ Capacity building of Associations and FSC for seed production and market oriented products ▪ Using the lessons learnt of developmental projects	causing land slides ▪ Security risks hamper timely input supply ▪ Damage to crops due to droughts or floods ▪ Development activities can be hampered any time due to terrorism ▪ Conflict among the stakeholders in selection of beneficiaries

3-2-3 SUB SECTOR: HORTICULTURE

MARKET POTENTIAL

Horticulture in SWA consists primarily of vegetables and fruits. As both vegetables and fruits are processed in similar marketing chains therefore they are jointly discussed below.

POST-HARVEST MANAGEMENT

Post-harvest management covers the picking, grading and packing of fruits and vegetables as well as the storing and identification of potential markets. Currently, post-harvest handling capacity is very weak and invariably results in losses to farmers, especially perishables. Critically important here is mismanagement during the post-harvest, such as untimely picking/harvesting, no grading/sorting, faulty packaging and the lack of processing[21] and storing facilities, etc. Necessary guidance to grower communities in improved handling and developing appropriate packaging for reducing losses is crucial. To minimize post-harvest losses and increase income, the following interventions in commercial fruit and vegetable production (e.g. apple, peach, plum, apricot, pine nut and tomato) are proposed;

VALUE ADDITION

As mentioned earlier apple, peach, apricot, plum, pine nut and tomato are produced in bulk in SWA. They are sold in local and national markets but fetch low returns for the growers. Post-harvest losses occurred to most of these products happen. Value addition of these products could be one of the options to address post-harvest losses. For instance:

- Processing fresh fruit (into jams, pulp and squashes) and tomato (into paste, pulp and ketchup) by establishing small and medium processing units in Wana administrative unit.

- Bringing pine nut roasting technology into Wana and Ladha administrative units and training the local entrepreneurs in roasting.

Cardboard Box used for Apple in SWA

[21]There is one processing unit with the name of "Jam-e-Wana produces processed consumer products like jams, murabbas, etc. FIRMS Project funded by USAID

Roasting machinery along with necessary training could be provided to growers and traders.

- Solar tunnel drying is another technique using solar energy for drying fruit and vegetables. Introduction of this technology in Wana Administrative unit of SWA could address post-harvest losses, increase income and create employment opportunities in the area.

PACKING AND PACKAGING UNIT

Most of the post-harvest losses are due to improper practices and use of conventional packing by unskilled labors. Wooden crates are mostly used for all fruit and tomato in SWA. However, the trend of using cardboard boxes that are supplied from Lahore is now increasing in SWA, especially for apples. The proposal here is to establish packing and packaging units so that farmers can reduce losses, better market their products and increase their earnings.

ORCHARD ESTABLISHMENT & MANAGEMENT

To strengthen fruit culture, three activities are necessary, namely, the management of existing orchards, the establishment of new orchards and the creation of a fruit nursery. Growers of existing established orchards should be supported in the proper management of trees. Training should be provided in skill areas such as pruning, top-working, Integrated Pest Management (IPM), trees nutrition, and post-harvest management.

Under this intervention, a few potential orchard sites in each *tehsil* of an administrative unit should be selected as demonstration points where growers can be trained on various aspects of orchard management. The participating growers (20 - 25 farmers in one group per site) should be assisted by the trained staff of Agriculture Extension with necessary inputs and tools to manage their orchards by applying the inputs and using their learning.

For new orchard establishment, selection of participating farmers and the site is very critical. Since the activity would be a long term one, willingness and interest on the part of participating farmers is a must. The selected individuals should be provided training in plant husbandry and business development in addition to the provision of technical assistance in orchard skills and the use of essential inputs (planting material, drip irrigation systems and fencing materials) for one to two acres land.

FRUIT TREE NURSERY ESTABLISHMENT[22]

This is a highly technical activity that requires skills to produce plants as well as to market them. Sites that have irrigation facilities and that are accessible to customers and service providers are preferred for this intervention. The willingness of growers to manage the availability of skilled labors is necessary for the success of this activity. The proposal here is to select potential farmers and provide them with technical support for sowing, budding and grafting. Forest plants can be

[22]There are 12 fruit nurseries in SWA each on one to two acres of leased land that is managed by Agriculture Extension Department. Of the 12 nurseries, three are in Wazir area and nine are in Mehsudarea.According to the Agriculture Officer Wana, most of the nurseries are not functional because of scarcity of water, lack of staff and security reasons.

grown with fruit trees and plants to provide quick returns. It is recommended here to start this activity initially in Wana (for apple, peach, apricot, plum and grapes) and Serwekai (for walnut) and if successful then extend it to other areas.

It would be useful here to develop fruit mother trees of different varieties under supervision of the Agriculture Extension Department and with technical support from the Agriculture Research Institute DI Khan and Tarnab-Peshawar. This fruit farm will maintain the mother trees and provide bud wood and graft wood of different varieties of fruit to nurserymen for further multiplication of plants.

OFF-SEASON VEGETABLES UNDER PLASTIC TUNNEL

Off season vegetables can be cultivated with an artificial technique like tunnel technology, in which temperature and moisture is controlled for specific growth of vegetables. The production of vegetables all year round enables the growers to fully utilize their land resources and increase their incomes. Given the success of tunnel farming in FATA[23], off-season vegetables (cucumber, squash, chilies, brinjal and tomato) production in plastic tunnel holds good potential in Wana administrative unit of SWA. The proposal here would be to support farmers not only in securing inputs but also providing them with technical assistance. The material required for this includes plastic sheets, plastic wire, hybrid seeds, fertilizers, chemicals, pipes, foothold, mulberry sticks and drip irrigation system.

STRENGTHENING COMMERCIAL VEGETABLE FARM

In SWA, there are certain areas, which are specialized in producing specific vegetables on a commercial scale which are then marketed in local and settled area markets. Farmers growing these vegetables are now more interested in growing a wide range of short, medium and long duration varieties of vegetables. Following issues provided in Table 3-8 (below) in some of the commercial vegetables in all three Administrative Units of SWA need attention for improvement:

TABLE 3- 8: RECOMMENDATIONS FOR SELECTED COMMERCIAL VEGETABLES

VEGETABLE	ADMINISTRATIVE UNIT SWA	RECOMMENDATIONS TO ADDRESS ISSUES
Tomato	Wana	▪ Launching Farmer Field School to address crop management especially insect/diseases ▪ Value addition through processing unit to reduce post-harvest losses and increase income ▪ High Plastic Tunnel with drip irrigation for extending tomato supply to markets ▪ Tomato growers and local Inputs suppliers link with seed companies for supply of high quality hybrid seed for better production.
Potato	Ladha	▪ Potato growers link with private seed companies for seed production using FSC

[23] USAID funded upper FATA Livelihood Development Program (LDP) piloted Plastic Tunnel Farming activity in FATA in 2008-09

		forum ▪ Launching Farmer Field School to address crop management especially insect/diseases ▪ Collective marketing for inputs and products
Enhancing market oriented production of vegetables	Serwekai	▪ Introduction of market demanded varieties of vegetables ▪ Exposure of farmers main growing areas of vegetables ▪ Collective marketing for inputs and products

RESOURCE REQUIREMENT

FINANCIAL

Estimates of financial resources required for developing the sub sector Horticulture are provided In Table 3-9 (Below).

TABLE 3-9: ESTIMATED COST OF INVESTMENT OPTIONS FOR SUB SECTOR HORTICULTURE INTERVENTIONS

S. #	Investment Option	Administrative unit in SWA	Quantity/No	Estimated cost	
				PKR (million)	USD (million)
1	Orchard establishment & management	Wana, Serwekai & Ladha	1,214 hectares	500	5.15
2	Fruit tree nursery establishment to support private nurserymen	Wana, Serwekai & Ladha	20 Nos	30	0.31
3	Off-season vegetable under plastic tunnel	Wana	405 hectares	250	2.58
4	Strengthening commercial vegetable farm	Wana, Serwekai & Ladha	405 hectares	150	1.55
5	Food Processing Units	Wana and Ladha	03 products	150	1.55
6	Solar Tunnel Dryers	Wana and Ladha	50 products	50	0.52
7	Pine nuts Roasting Technology and training	Wana and Ladha	50 products	100	1.03
8	Pack house	Wana	One	100	1.03
9	Fruit mother tree farm	Wana	One (81 hectares land)	200	2.06
Total (conversion rate US $ = PKR 97)				**1530**	**15.78**

MARKETING

The following marketing activities are proposed for the products to be produced in above mentioned interventions: identification of niche markets for off season vegetables; introduction of improved packaging for fresh vegetables and fruits; identification of market potential for value-added products; site feasibility studies for establishment of processing units, solar tunnel dryers and pack house; and, establish linkages with reputable vegetable seed companies, etc. Details in Annex 3-4.

SKILLS

The following skills would be required: production scheduling; growing a crop range which includes a mix of high and low risk products; investing in technology which increases yield

stability; use of improved harvesting techniques, pre-cooling, grading and packing; understanding dynamics of markets, consumer behavior, price and market information; develop plastic tunnel structures; fruit tree nursery production, management and its marketing skills; orchard management including grafting and top working skills.

TECHNOLOGY

Technologies required for this sub sector are: plastic tunnel farming; solar drying for fruits and vegetables; kitchen gardening using treated waste water; drip irrigation; fermented water tank; roasted pine nuts machinery; pack house technology; technology for processed, canned and dehydrated vegetables and fruits; and, a fruit Germ Plasm Unit for the supply of quality bud wood and graft wood to private nurserymen

INFRASTRUCTURE

Farm to market roads, market place with facilities and community-based irrigation facilities are the basic infrastructures to be required.

SWOT ANALYSIS

STRENGTH	WEAKNESS
▪ Approved FATA Horticulture Policy ▪ Different agro-ecological zones for wide range of high value crops ▪ Commercial growers for fruit and vegetables available in SWA ▪ Source of high income ▪ Horticulture specialists in the Agricultural University & Agricultural Research System ▪ Specialized horticulture Development Company at national level ▪ USAID program on horticulture and livestock through Agribusiness Support Fund in FATA ▪ Low cost labor/family labor available ▪ Network of Agriculture extension staff ▪ Main roads funded by USAID linked Wana market with other national markets	▪ Lack of regulations and certification system in FATA and farmers have poor resources ▪ Non availability of quality plant material, vegetable seed and new varieties ▪ Subsistence production due to small farm size and scarcity of water ▪ Lack of processing, grading, packaging & cold storage facilities contribute in low income. ▪ Farm to Market roads ▪ Lack of comprehensive data for the sector ▪ Traditional, out-dated delivery mechanisms ▪ No grading and labeling of the produces ▪ Lack of knowledge & know how about certification of the product ▪ Reluctance of private sector for investment ▪ Difficult to monitor activities in sensitive areas
OPPORTUNITIES	**THREATS**
▪ Linkages and exposure of fruit and vegetables growers with national &international markets, established nurseries and fruit farm in Pakistan. ▪ Potential role of private sector in packaging and processing industries establishment ▪ Establishment of pesticides& soil testing laboratory& Private fruit nursery ▪ Innovations in horticulture production and marketing techniques ▪ Value Chain Analysis and value addition ▪ Plastic Tunnel farming for off season vegetables. ▪ Promotion of water efficient fruit orchards and	▪ Access to potential areas due to security. ▪ Reluctance of resource persons to work in FATA due to security ▪ Selection of beneficiaries for intervention ▪ Conflict causes blockage of roads hamper in time supply of inputs and disposal of perishable vegetable and fruit ▪ Uncertainty of donor's fund flow ▪ The ongoing developmental activities can be hampered any time due to terrorism ▪ Acceptability of NGOs in FATA ▪ Failures in plastic tunnel farming occur during seed

high value crops using drip irrigation. ▪ Capacity of growers in market oriented production ▪ Rehabilitation of Agriculture& Livestock facilities ▪ Organized Producer's association	germination stage ▪ Targeting non deserving people ▪ Security risk hamper in time inputs supply

3-2-4 SUB SECTOR: LIVESTOCK & POULTRY

MARKET POTENTIAL

Livestock rearing is an essential component of the household economy. Animals are a source of milk and meat, supply draught power, and provide dung which serves both as fuel and fertilizer. Hides, skins, wool and other products are the raw materials for livestock-based industry. The interventions proposed below cover almost each aspect of livestock development. Due to the nature of the topography of administrative units in SWA and the conflict and insurgency situation, the developmental interventions proposed here are mostly for Wana and to a limited extent for Serwekai and Ladha.

NUTRITION IMPROVEMENT

Fodder crop production, range/pasture improvement, and utilization of barley hay, wheat straw and maize are methods of improving animal nutrition without purchasing expensive premix feeds. The number of livestock rearing on stalls feeding or grazing depends on the availability of feed.

Pasture/range land management: The available range land has become insufficient for an increasing livestock population. All livestock during winter has to rely on crop residues that are very low in crude protein. Consequently, many animals are undernourished and weak till the onset of spring. Range land restoration is a common area of intervention to address the feed/fodder issue. Most of the range land/ pasture is communal land of the administrative unit and needs proper management. Range land management is one of the options to support improved livestock feed and nutrition. Fencing of the land, re-seeding of the barren part of the land, rotational grazing and plantation of fodder trees would be important activities under this investment option. The community would adopt controlled grazing for a period of three years as per an agreement. Paid labor selected by community would ensure controlled grazing on the fenced land. After three years, the community would gradually practice rotational grazing as per a fixed schedule. Initially it should be tried in one or two sites in each Administrative unit and if successful, be replicated in other areas. Ladha, Makeen, Wana in SWA could be the potential sites for initial investment.

SWA nomads coming down to DI Khan in winter

Fodder production: The size of the herd depends mainly on the household's capacity to purchase animal feed in the winter and spring months, when natural fodder is thin on the ground. Varieties and cuttings of different fodder should be tested on farmers' fields to find the best one suitable to the area for further multiplication. Farmers could be supported with the seed of improved varieties and cuttings of fodder. The Agricultural University and the Agriculture and Livestock Research System could be consulted for improved varieties of fodder and seed source.
Feed supplements: Farmers need orientation and training in skills for synthetic feed such as urea molasses blocks etc.

LIVESTOCKBREEDING PROGRAM FOR ENHANCING PRODUCTIVITY

Small (goat and sheep) and large ruminants (cow) are kept by farm families in SWA. Average production from these livestock is low mainly due to low quality breed and improper management practices. The intervention that is being proposed here is to focus on assisting producers with breeding services, ensuring veterinary coverage, and providing practical veterinary training. It is recommended to support growers/owner of herd by providing high quality bucks and rams to sheep and goats herds with necessary training in the management of farm and feed. In case of cattle breed improvement, artificial insemination activity need to be strengthened with the establishment of cold chain breeding program. The staff and private technicians need to be trained in advanced embryo technology. Liquid Nitrogen Tanks of different capacity[24] for storing semen could be provided to livestock department to transport semen from Peshawar to Tank and then onward to the field on an as needed basis. This will increase the efficiency of A.I technicians by providing timely availability of quality semen.

VACCINATION & DEWORMING PROGRAM

Various types of diseases and parasites cause enormous losses to livestock in FATA. Vaccination and deworming is an activity to protect livestock from attack of contagious diseases and parasites that could kill them. The decision to vaccinate is influenced by factors including the type of stock, seasonal conditions, previous property history, location and economics. Deworming is the use of anthelmintics to kill parasites living in or on the body of animal. In FATA only 15-20 % of the farmers avail this facility due to lack of resources and unawareness. It is recommended to support farmers by providing vaccines and dewormers through technicians and ensure that all livestock in each Administrative unit are properly vaccinated and dewormed. Campaign is proposed at Administrative unit level through Farmer's association and involving Government Veterinary staff for their services and tribal elders to convince all farmers for this activity.

FEED LOT FATTENING PROGRAM

There is a sizeable population of male calves of cattle, bucks (goat) and rams (sheep) in SWA. These calves and male sheep and goats are not properly reared and sold at cheaper price. If these calves are given balanced rations a much higher growth rate can be achieved. Normally, these underweight calves and bucks and rams are slaughtered without proper fattening. To improve meat production and fulfill the consumer demand of local and national markets, cattle calves and rams and bucks are required to be fattened through feed lot system. Assistance would be needed from Pakistan Dairy Development Company and FATA Livestock and Dairy Development Department to assist growers to take advantage of this intervention in SWA. Initially, this

[24] Liquid Nitrogen Tank capacity of 2 to 3 liters to be used in the field by AI technician, 50 liter tank will be used for transportation of semen from Peshawar to Tank and 250 liter will be kept in Tank as semen bank.

activity can be rolled out in Wana and to a limited extent in Ladha and Serwekai administrative units.

WOOL SPINNING AND WEAVING ENTERPRISES

Wool spinning and weaving is a traditional skill in SWA. It was once a major source of livelihood and import substitute for a large number of rural households. However, it is now at the verge of extinction. The reasons behind this rapid extinction is the non-availability of quality wool, poor working tools, lack of innovation, lack of trained people, and low quality of production that limits marketing prospects. Great potential of wool enterprise in terms of jobs creation and income exist in Wana Administrative unit. Two strategies are proposed for this intervention. First strategy involves supporting herd's men in the breeding aspect by providing improved breed rams and increase the capacity for farm management including animal's health and feed. The second strategy is to provide support to the interested artisans in improving their weaving skills as per the current market demand and financially support the replacement of working tools with modern more efficient ones.

SHED FOR ANIMALS

The community in SWA suffered due to insurgency and conflict and they have lost their livelihood assets including animals and shelter for animals. The most affected people are in Serwekai and Ladha administrative units who lost most of their livelihood assets. With the support of Army and other Government and non-Government organizations, the displaced persons are returning to their areas to restart their livelihood. Besides, other basic needs, shelter[25] for animals are one of the investment options. It is proposed for the rehabilitation and reconstruction of shelter for animals in Serwekai and Ladha administrative units.

POULTRY

In SWA, there is great demand for eggs and meat which are mainly supplied from the settled areas. During last couple of years the poultry sector facilities suffered and infrastructure and other facilities related to this subsector destroyed due to insurgency. The Army is assisting the affected people in the establishment of poultry shed and distribution of poultry birds for quick income generation especially in Mehsud areas (Sararogha, etc.). This intervention proposes establishment of 350 layer and broiler farms in all three Administrative units. Because of poor resources and unawareness about quality inputs and birds, the farmers are reluctant to invest in this intervention by themselves. Supporting farmers on a cost-share basis in securing inputs and good breed of poultry birds (500 to 1000 per farm) could be a good initiative to establish this enterprise. Farmers should be supported in the construction of farm structure on their own land. Formation of poultry farmer's association is necessary to address supply of quality inputs and selling of eggs/meat. Another option for this intervention is to support families with 10 to 12 layers without farm structure. This can fulfil the demands of a family and also enable them to sell eggs to their neighbours and earn income. Kitchen wastes and other grains can be the source of feed. The objective of this intervention is to create income generation opportunities especially for women and landless people.

[25] UN-FAO has assisted earthquake affected people in in construction of shelter for livestock in Balakot- Mansehra during 2005-6

RESOURCE REQUIREMENT

FINANCIAL

Estimates of financial resources required for developing the sub sector Livestock are provided In Table 3-10 (below).

TABLE 3-10: ESTIMATED COST OF INVESTMENT OPTIONS FOR SUB SECTOR LIVESTOCK INTERVENTION

S. #	Investment Option	Administrative unit in SWA	Quantity/No	Estimated cost	
				PKR (million)	USD (million)
1	Nutrition improvement	Wana, Serwekai & Ladha	For 35,000 animals	180	1.86
2	Poultry Farm	Wana, Serwekai & Ladha	350 farms	500	5.15
3	Animal's Breeding Program for enhancing livestock productivity	Wana, Serwekai & Ladha	AI facilities, 10,000 bucks and rams& cool chain semen	500	5.15
4	Vaccination & Deworming	Wana, Serwekai & Ladha	100,000 heads	40	0.41
5	Feed lot fattening program	Wana, Serwekai & Ladha	15,000 calves, 15,000 bucks & rams	100	1.03
6	Support in animal's shed	Serwekai and Ladha	10,000	1,000	10.31
7	Wool Spinning and Weaving Enterprises	Wana	5 sites	15	0.15
Total (conversion rate US $= PKR 97)				**2,335**	**24.06**

:

MARKETING

Marketing for livestock and its products are discussed here**:**

- Market collection points to group animals together for shipment to urban markets by farmer's association with the external facilitation is necessary.
- Livestock Farmer's Association need to be formed and strengthened
- Functioning slaughter house should be established in each Administrative unit
- Poultry Association needs to be linked with private feed and birds companies

SKILLS

The following skills will be required for the implementation of proposed investment options:

- Extension services should be delivered through Farmer Field School Approach
- Artificial Insemination skills required both for Private Livestock Extension Workers and Vet staff.
- LEWs and Vet staff should have Poultry management and Wool shearing skills
- Vet staff and private Livestock Extension Workers (LEWs) should have skills to identify the characteristics of different breed of livestock, symptoms of diseases and know the treatment.

TECHNOLOGY

New and updated technology for livestock and dairy development is needed and will include;

- System for Monitoring and reporting about disease occurrence
- Establishment of Embryo Transfer Technology Center and Semen Production Center
- Technology for Animal Quarantine Stations in FATA
- Silage making, fodder chopping machine and urea molasses blocks are the other technology required for improved feed making to increase milk and address animal's health.
- Technological tools required to reduce losses of milk due to flawed supply chain practices.

- Animal's fattening and wool spinning and weaving technologies

INFRASTRUCTURE

Already covered in option No 5

SWOT ANALYSIS

STRENGTH	WEAKNESSES
▪ Livestock is an asset for women and landless ▪ Livestock is an integral part of livelihood ▪ Customary rights in grazing areas are the motivational forces for resource sustainability ▪ Training sources in public and private sector. ▪ Area suitable for small and large ruminants ▪ Local tradition in pasture management ▪ Networking of livestock department staff ▪ Presence of large pasture/range land	▪ Livestock rearing at subsistence level ▪ Degradation of pasture/ range land ▪ Shortage of green fodder in winter ▪ Animals are poorly nourished, disease and parasite infestation ▪ Lack of improved livestock breed ▪ Animal market sites lack facilities ▪ Farmer's access to veterinary services ▪ Veterinary facilities demolished. ▪ Illegal smuggling of animals causes trans-boundary transmission of diseases
OPPORTUNITIES	**THREATS**
▪ Potential role of private sector in value addition of dairy products ▪ Restocking program for IDPs ▪ Proper planning and Management of pastures ▪ Introduction of varieties of fodder ▪ Strengthening livestock farmer's association ▪ Training private livestock extension workers ▪ Farmer Field School for extension services ▪ Integrated approach for livestock management ▪ Fattening of calves &small ruminants ▪ Linkages of farmers to livestock trading areas ▪ Support market linkages and train farmers in enterprise development	▪ Epidemic disease occur in livestock and poultry and a fear of great losses ▪ Where capacities exist, the security situation in SWA hinders field service delivery. ▪ At the administrative level, poor control over the cross-border movement of animals also affects the local livestock economy ▪ In case of becoming IDPs, losses to animals due to slaughtering or selling on low price or theft may occurs ▪ With the introduction of exotic breed, the disappearance of local indigenous breed in FATA ▪ Security threats to investors and traders

3-3 AGENCY DEVELOPMENT PLANS FOR AGRICULTURE

3-3-1 INVESTMENT OPTIONS FOR AGRICULTURE

The assessment provided in the previous chapter has led to the development of 25 proposed interventions covering cross cutting interventions for general agriculture and specific cereal crops, horticulture & high value crops and livestock. The proposed interventions are provided in Table 3-11 and will require an investment of US $ 51.83 million.

TABLE 3-11: INVESTMENT OPTIONS FOR AGRICULTURE

SUB DIVISION	INVESTMENT OPTION	Estimated Cost (million $)
WANA	Sectoral Interventions (Farm Services Centers, Land reclamation and leveling, Producer Associations, Farmer's Field School, establishment of soil laboratory and Rehabilitation of Livestock Facilities)	2.17
	Sub sector Cereal Crops (Increasing Crop Productivity, Seed Production and establishment of seed farm)	2.37
	Sub sector Horticulture (Establishment of fruit mother tree farm, Fruit orchard & nursery, Off season vegetable & commercial vegetable, Value addition, Post-Harvest, food processing unit, solar tunnel dryers, roasting technology &pack house)	9.82
	Sub sector Livestock (Nutrition, Poultry Farm, Animal's Breeding, Vaccination & Deworming, Feed lot fattening, &Wool Spinning and Weaving Enterprises)	4.68
Total Wana Sub Division investment		**19.04**
LADHA	Sectoral Interventions (Farm Services Centers, Land reclamation and leveling, Producer Associations, Farmer's Field School and Rehabilitation of Livestock Facilities)	3.26
	Sub sector Cereal Crops (Increasing Crop Productivity, Seed Production)	0.47
	Sub sector Horticulture (Fruit orchard & nursery, strengthening commercial vegetable, Value addition, Post-Harvest, food processing unit, solar tunnel dryers, roasting technology)	3.64
	Sub sector Livestock (Nutrition, Poultry Farm, Animal's Breeding, Vaccination & Deworming, Feed lot fattening, animal's shed)	9.84
Total Ladha Sub Division investment		**17.21**
SERWEKAI	Sectoral Interventions (Farm Services Centers, Land reclamation and leveling, Producer Associations, Farmer's Field School and Rehabilitation of Livestock Facilities)	3.26
	Sub sector Cereal Crops (Increasing Crop Productivity, Seed Production)	0.47
	Sub sector Horticulture (Fruit orchard & nursery and commercial vegetable)	2.32
	Sub sector Livestock (Nutrition, Poultry Farm, Animal's Breeding, Vaccination & Deworming, Feed lot fattening, animal's shed)	9.53
Total Serwekai Sub Division investment		**15.58**
TOTAL SWA AGENCY INVESTMENT		**51.83**

RECOMMENDATIONS FOR IMPLEMENTATION

The SWA ADP Agriculture program could be implemented by NGOs, CSOs, farmers associations, Agriculture and Livestock Departments of FATA Secretariat as well as the Pakistan Army. The NGOs, CSOs and farmers associations would primarily focus on implementing interventions with technical support from Agriculture/Livestock department staff. The Pakistan Army can help provide guidance and access to the hard to reach areas of the agency where security remains as an issue.

Broadly, interventions proposed here are for development and rehabilitation of agriculture program in SWA. Administrative unit Wana has the greatest potential for horticulture. It has been less affected by the insurgency when compared with the other two administrative units and can be considered for on farm and off farm developmental activities. The Administrative units Serwekai and Ladha have been severely affected by the conflict so here, initially, the focus should be on: rehabilitation of agricultural infrastructure; restocking; land reclamation; and, support in accessing inputs/services.

Those agriculture interventions that should be given priority are those that leverage existing and planned USG supported investments in SWA. This would include those interventions that are linked to irrigation facilities connected with the Gomal Zam Dam or to the network of roads under the FATA Infrastructure project.

The Agribusiness Project, funded by USAID, has a mandate of enhancing horticulture and livestock competitiveness across the country, including FATA. It is proposed that this project should consider picking up some of the interventions being proposed for the two sub sector of ADP (i.e., horticulture and livestock).

4 TRADE
4-1 TRADE SECTOR OVERVIEW

INTRODUCTION
Trade sector in Federally Administered Tribal Areas (FATA) is highly complicated as most of it is undocumented. Trading activity across FATA can be broadly rationalized in three categories:

- ***Inter-Agency Trade***. This includes trade of items used for consumption by the local population of around 4 million[26]. This segment mainly includes flour, sugar, brown sugar (gurr), vegetables, rice, edible, oil, Petroleum products, other food items, medicines, and manufactured goods. The total population of SWA is estimated at around 530,000 in 2009. The main products are transported through the available road networks or tracks from other agencies or settled areas and traded through the local markets.
- ***Trade with Settled Areas*.** SWA is rich in natural resources that results in large movement of items outward from the agency unlike most of the other agencies. This includes transportation of items being produced in the region that mainly consists of fruit, vegetables, and minerals. It is estimated that over 350 truckloads are transported daily between SWA agency and the settled areas[27]. The Agency is deficit in edible items so flour and oil are main items transported from settled areas to SWA
- ***Cross Border Trade*.** The total number of trucks travelling on the SWA roads exceeds 125,000 per year (includes, cross border and local trade). The main border crossing point is at Angoor Adda which connects Afghanistan with the Indus Highway through D.I. Khan District of Khyber Pakhtunkhwa province. The Angoor Adda pass and other border crossings are primarily used for conducting illegal trade between SWA and Paktika province of Afghanistan. The agency is connected to Afghanistan through two other border crossings – one at Warsak (crossing through Gomal River) and the other at 'Khaand'. Angoor Adda is the crossing most widely used because the area is inhabited by the Wazir tribe who are mainly involved in trading. The other two crossings are also in Wana sub division and fall within the area of Suleman khel tribe.

4-1-1 TRADE INFRASTRUCTURE IN SWA
Markets and roads are the two main elements of trade infrastructure in SWA. The state of these facilities has been significantly affected by the militancy and military action in SWA.

MARKETS
SWA is mainly dependent on markets inside and outside the agency, such as, in D.I. Khan and Jandola (FR Tank), etc. A number of markets across the agency have been damaged to varying extent because of conflict. For instance, markets in Ladha and Serwekai administrative units have been severely damaged whereas markets in Wana have not. Markets within the agency are usually constructed in a traditional manner i.e., they are not constructed using Reinforced Cement Concrete (RCC) structure but instead use brick and cement. In some instances, shops are made from wood and mud called *Kacha*.

Main markets in SWA are shown in the map below in Figure 4-1. Of these, the key trading posts are in Wana, Sararogha, Chaghmalai and Azam Warsak. Those markets that have been badly damaged

[26] FATA Bureau of Statistics 2009
[27] Traffic studies conducted by A.A.Associates

and need to be reconstructed are in Makin, Sararogha, Spinkai Rakhzai, Barwand, Chaghmalai, Molvikhan Serwwekai, Makeen, Ladha, Kanigoram, Azam warsak, Bakhan and Rustam. In addition to these, another important market in Jandola that was on the border between SWA and Tank and had around 400 shops has also been completely destroyed.

Figure 4-1: SWA MARKETS

Source: Information secured from Google Earth & Survey of Pakistan

There are few fruit and vegetable *mandis* in SWA, especially in Wana, from where locally produced fruits, dry fruit, and vegetable is traded and then transported to settled areas, or, to Afghanistan.

Mineral resources are concentrated in Ladha and Serwekai sub division but as discussed in the section on Minerals there is limited economic activity within this sector. Typically, mines are owned by local tribes and rented out to miners. These miners sell produce to dealers in North Waziristan and Peshawar either directly or through middlemen.

ROADS

Main means of transport across FATA is through roads. Generally, the availability and condition of existing road network is weak which directly affects the development of trade across the region. FATA's road network comprises of a total of 6,226 kilometer of roads, of which around 2,248 kilometers of roads are shingle and 3,978 kilometers of roads are blacktop.

The road network is characterized as having inappropriate alignment and design specifications. The roads in FATA have a road density of 0.21 Km/per sq. km as compared to 0.32 Km/per sq. km for Pakistan[28]. Details about the road network in SWA over a three-year span are provided in Table 4-1 below.

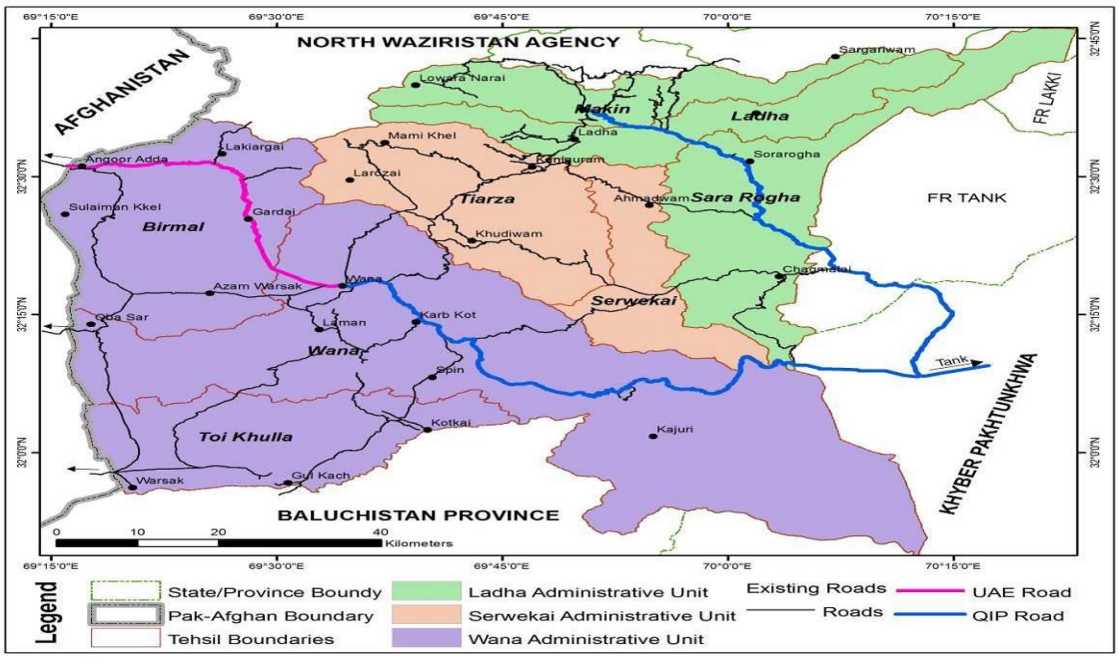
TABLE 4-1: ROAD NETWORK IN FATA

Area/Agency	2006-07			2007-08			2008-09		
	Black Top	Shingle	Total	Black Top	Shingle	Total	Black Top	Shingle	Total
FATA	**3,663**	**2,147**	**5,810**	**3,808**	**2,111**	**5,919**	**3,978**	**2,248**	**6,226**
SWA[29]	474	419	893	485	407	892	544	473	1017

Source: FATA Bureau of Statistics 2009

USAID is funding the development of road networks across SWA through the FATA Infrastructure Project. So far, two metalled roads have been constructed under the FIP which are the 105 Kms Kaur - Wana road and the 110 Kms Tank - Makin road. The main impetus for improving road infrastructure stems from the need to stabilize the agency and improve its connectivity with the rest of the country. The positive impact of these improvements is already being realized in both cost and time savings. For instance, travel between Wana and Tank or D.I. Khan has been cut short by two to three hours with a corresponding cost-savings in fuel of over 25%. More efficient transport links also results in a reduction in damage to goods and vehicles. The two roads mentioned here were developed under the Phase 1 of FIP and there are more roads planned for the second and third phase of FIP as well. Roads that will be developed in subsequent phases include: Wana-Torwam-Makeen road; Torwam-Shakai; Tank-D.I. Khan road; and, Makin-Miranshah road. Major roads in SWA, including those supported by FIP and UAE, are shown in Figure 4-2 below.

FIGURE 4-2: MAP OF SWA SHOWING EXISTING ROADS



Source: Information secured from Google Earth, USAID & Survey of Pakistan

[28] Khyber Pakhtunkhwa Bureau of Statistics

[29] Road network in FATA as well as SWA has improved especially due to the QIP roads but latest official figures were not available

The main cross-border road from Wana enters Afghanistan at Shkin village in Paktika province. Two key towns on either side are Angoor Adda in SWA and Rabat bazaar in Afghanistan. The towns are linked by a 16 Kms stretch of road that is not in good condition. If improved, this road can serve as a viable trading route to Afghanistan and, then onwards to, Central Asia. Work on improving the SWA portion of this road is currently underway with funding support from the UAE. It is anticipated that the portion of this road that links Wana to Angoor Adda will be completed in a few months and will be the first black top road connecting both countries through SWA.

Next, two main categories of roads that play an important role with regards to trade are discussed - mine to market roads and farm to markets roads.

MINE TO MARKET ROADS

Sustainable economic development of SWA is highly dependent on exploiting the natural endowments available in the region. Marketing and trading of minerals in an efficient manner is only possible with development of appropriate mine to market roads across the mineral bearing areas. Given the lack of public funds, it is usually the private sector mine owners who take on the responsibility for building mine to market roads.

FARM TO MARKET ROADS

Farm-to-market roads directly result in lowering the cost of transportation and reducing wastage of produce. Most of the agricultural produce of SWA finds its way to main markets of the country. Some vegetables as well as fruit are also exported to Afghanistan. There is an abundant supply of fruits and vegetables (such as, apples, walnut, pine nuts, tomatoes, potato, etc.) that are transported to Peshawar, Rawalpindi, and Lahore. Development of proper farm to market roads can play a key role in development of SWA.

4-1-2 INSTITUTIONAL FRAMEWORK

FATA SECRETARIAT (FS)

FS plays a major role with regards to the trading sector mainly through the office of Political Agent for each Agency. The office of Political Agent is responsible for: monitoring of all trading activity within the Agency; ensuring price controls and quality assurance; and, checking marketing of prohibited items. FS builds and maintains the road infrastructure in accordance with the approved ADP through its Works & Services Department. The Political Agent of SWA is supported by three Assistant Political Agents to manage each of the Administrative unit.

FATA DEVELOPMENT AUTHORITY (FDA)

FDA plays an important role in development of the trade sector as it is responsible for, among other things, the industries sector as well as mine to market roads. FDA is planning to construct 62 Kms of mine to market roads in SWA at a cost of around USD 14.8 million.

TRIBAL AREAS CHAMBER OF COMMERCE & INDUSTRY (TACCI)

TACCI is a representative body for traders, industrialists and business community of FATA.

TRADE DEVELOPMENT AUTHORITY OF PAKISTAN (TDAP)

TDAP has been established by the GOP to promote and facilitate exports of Pakistan in line with its trade policy. It is under the administrative control of the Ministry of Commerce.

FEDERAL BOARD OF REVENUE (FBR)

FBR manages all cross border trade flow through the Pak Afghan border through Pakistan Customs. Pakistan Customs is tasked with securing the borders against movement of contra band goods and is a facilitator of bona fide trade. Border crossings in SWA do not have any proper customs check points to facilitate cross border trade.

FRONTIER CONSTABULARY (FC)
FC plays an important role in being the custodian of borders and being responsible for security in the area. FC is also involved in checking movement of goods between different agencies.

FATA MINE OWNERS ASSOCIATION (FMOA)
FMOA is a representative body of mine owners from FATA and plays a pivotal role in resolving internal issues and taking up problems of the mine owners at relevant forums.

SARHAD CHAMBER OF AGRICULTURE
The Agricultural community does not have any dedicated representative body though some growers from FATA are members of the Sarhad Chamber of Agriculture that is the provincial chapter of the national level Chamber of Agriculture.

4-1-3 REGULATORY FRAMEWORK
The tribal areas have no primary laws relating to starting business, property rights, contracts, getting credit, collateral, mortgage, insurance, employing workers and other related laws that apply to the rest of Pakistan due to its non-extension, thus creating a legal void. In Trade sector, there are some areas that are where certain national regulations apply. These regulations are discussed briefly below.

PAKISTAN CUSTOMS ACT
Cross Border Trade is regulated by the Customs Act of Pakistan 1969 and Custom Rules 2001. There are two well-equipped Customs check Points at Torkham and Ghulam Khan.

AFGHAN TRANSIT TRADE AGREEMENT (ATTA)
The ATTA was signed in 1969 in order to ensure supplies to the land locked Afghanistan through ports of Pakistan. The transit trade portion of cross border trade is regulated by ATTA and bilateral trade between both the countries is more than USD 2.5 billion[30] . Pakistan and Afghanistan signed Afghanistan Pakistan Transit Trade Agreement (APTTA) in 2010 to address trade-related issues and bottlenecks faced by both countries.

FRONTIER CRIMES REGULATION 1901
All civil and criminal cases in FATA are decided under the Frontier Crimes Regulation 1901 by a jirga (council of elders). Residents of the tribal areas may, however, approach the apex courts (Supreme Court of Pakistan and Peshawar High Court) with a constitutional writ challenging the decisions.

4-1-4 GOP'S DEVELOPMENT STRATEGY
FATA SUSTAINABLE DEVELOPMENT PLAN (SDP)
Government of Pakistan has a well-documented Development Strategy for FATA in the shape of FATA SDP 2007-2015. Development of trade sector is addressed in the SDP and is implemented by FS and FDA through Annual Development Plans (ADP). The developmental initiatives highlighted in SDP relevant to Trade sector, which are in different stages of implementation, amounting to Rs. 37,155 Million.

TRIBAL AREAS RURAL-TO-URBAN CENTER CONVERSION INITIATIVE (TARUCCI)
An approach of "Social Transformation in FATA via Urbanization" by planning and establishment of small urban hubs in selected locations in FATA is being implemented as the TARUCCI by the GOP. The project focuses on development of bazaars/commercial areas, fruits and vegetables markets, slaughterhouses, bus and truck terminals, roads and border trade gateways. The project includes Wana and Serwekai from SWA in the list of cities to be developed as urban centers. The program is currently being implemented in Bajaur Agency.

[30] Pak-Afghan Trade discussion paper by PILDAT

DEVELOPMENT INITIATIVES BY PAKISTAN ARMY

The Pakistan Army is deployed in FATA due to the security situation and has initiated a number of developmental projects to rehabilitate the area. The Army has supported the local community by constructing markets, poultry farms, model villages, etc.[31] The FIP road construction is also being implemented by Pakistan Army through the Frontier Works Organization (FWO).

4-1-5 DONOR ASSISTANCE PROGRAMS AND STRATEGIES

USAID

USAID is the major donor supporting development initiatives across FATA. The main programs funded by USAID relevant to trade in SWA are highlighted below.

- The FATA Infrastructure Project has a special focus on SWA implementing road Infrastructure, water and Power sector projects.
- USAID's Pakistan Trade Project (PTP) plans to undertake a number of interventions to bring policy reforms and upgrade Infrastructure in order to facilitate cross border trade.

UNITED ARAB EMIRATES

The Government of UAE has provided funds for various projects that include construction of a black top road from Wana to the border village of Angoor Adda.

ECONOMIC REVITALIZATION OF KP & FATA (ERKF)

The Multi Donors Trust Fund (MDTF) is providing funding for a 20 million USD project for revitalizing affected businesses in KP and FATA. The SME Development component of ERKF Project provides rehabilitation grants to affected business in all FATA agencies, including SWA.

[31] Source: http://www.southwaziristanrehab.com/

4-2 TRADE OPPORTUNITY ASSESSMENT

SUB SECTOR SELECTION

Building on the overview provided in the preceding section, this section will provide detailed assessments of investment opportunities across key trade-related sub-sectors that have high development potential. The sub sectors for trade discussed here are: enhancing road infrastructure; strengthening markets; and, facilitating cross border trade.

4-2-1 SUB SECTOR: MARKETS

Markets serve as hubs of trading activity and offer linkages and support that are crucial for trade. Developing trade across the agency will be only possible by upgrading facilities offered at key trading centers. Markets in SWA are relatively weak and are highly dependent on markets in settled areas especially those in D.I. Khan and Tank. Improving market infrastructure and facilities will have a meaningful and sustainable impact on increasing trade across this region.

The approach proposed here to upgrade markets includes reconstruction of damaged markets and strengthening of specialized markets.

A. RECONSTRUCTION OF MARKETS

SWA has been in a state of war for almost a decade which has caused severe damage to its infrastructure. Majority of markets in Mehsud area (i.e., Ladha and Serwekai) and some in the Wazir area have been badly damaged and require reconstruction. It is envisaged that the proposed reconstruction activities will provide livelihood opportunities to the local communities, many of whom, are returning IDPs. Information for some main SWA markets that need to be reconstructed or strengthened is provided below. Information for proposed markets that can be considered for reconstruction is provided in table 4-2 below.

TABLE 4-2: DETAILS FOR PROPOSED RECONSTRUCTION OF MARKETS

S.No	Market	Admin. Units/ Agency	No. of big shops[32]	No. of small shops[33]	Other facilities
	RECONSTRUCTION OF MARKETS				
1.	Makeen market	Ladha, SWA	100	150	Warehouses, electricity, establishment and capacity building of Association
2.	Sara Rogha market	Ladha, SWA	50	100	Warehouses, electricity, establishment and capacity building of Association
3.	Spinkai Raghzai market	Serwekai, SWA	50	100	electricity, establishment and capacity building of Association
4.	Barwand market	Serwekai, SWA	50	100	Electricity, establishment and capacity building of Association
5.	Maula khan Serai market	Serwekai, SWA	50	100	Electricity, establishment and capacity building of Association

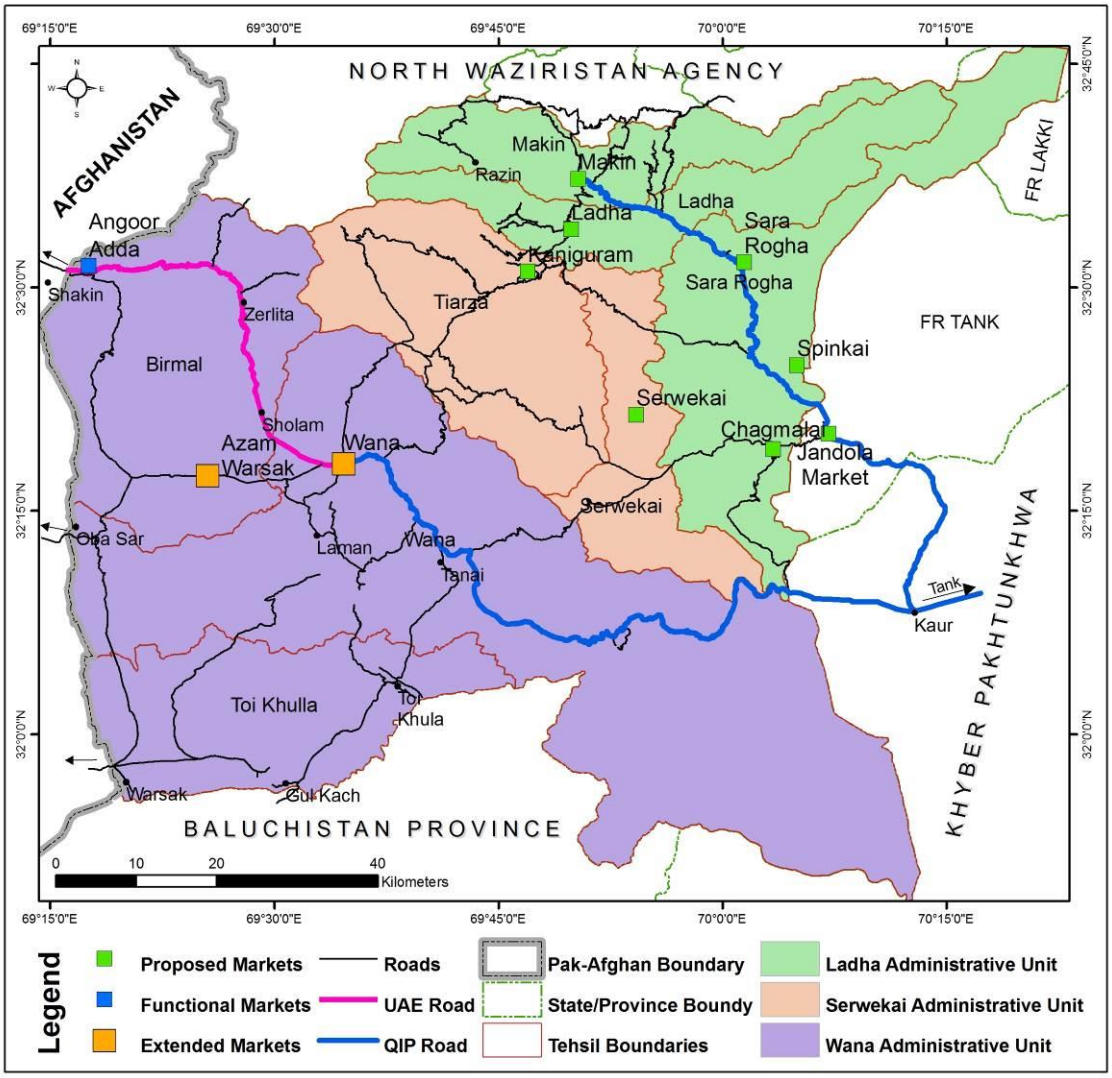
[32] Big shops refer to shops measuring 12' by 20'

[33] Small shops refer to shops measuring 10' by 12'

6.	Chaghmalai market	Ladha, SWA	50	50	Electricity, establishment and capacity building of Association
7.	Jandola market	FR Tank	100	100	Electricity, establishment and capacity building of Association
	Total		**450**	**700**	

The Figure 4-3 (below) shows a map of markets proposed for reconstruction and expansion/strengthening in SWA.

FIGURE 4-3: PROPOSED MARKETS IN SWA



Source: Information secured from Google Earth, USAID & Survey of Pakistan

The next section will provide information for strengthening of specialized markets which refers to expansion of existing fruits and vegetable markets.

B. SPECIALIZED MARKETS

The proposal here is to strengthen specialized fruits and vegetables markets in SWA. The idea is to further develop existing fruit and vegetable markets by improving their infrastructure and their access to facilities, such as, power, sewerage system, water supply, storage space, parking space, weighbridges, etc. These Specialized Markets will be linked with other markets of the country

through establishing an effective network and communication system. The markets will be provided management and administrative support by Market Committees[34]. Providing these facilities will enable the growers and traders to store and market their produce more effectively. Information for two proposed Specialized Markets is provided next and they are identified in the map provided as Figure 4-3.

FRUIT & VEGETABLE MARKET, WANA

Wana sub division is rich in horticulture produce and the fruit and vegetable market in WANA is the largest in the Agency with over a thousand shops. Fruits and vegetables traded here make their way all the way up to markets in Karachi and Lahore. Commodities traded here include apples, potatoes, tomatoes, dry fruits, etc. The proposal here is to build upon and further develop existing market facilities available at the Wana bazaar in partnership with the local community. Strengthening of the fruit and vegetable market would result in more organized trading activity and better market knowledge for the growers as well as the traders. It is envisaged that trading activities at the market will increase with the provision of facilities, such as, small warehouses, sheds, weighbridges, etc.

FRUIT & VEGETABLE MARKET, AZAM WARSAK

The Azam Warsak market can be considered to be the second largest market of Wana sub division with over 300 shops where locally produced fruit and vegetable are traded. Strengthening of the existing fruit & vegetable market would result in better market knowledge and increased margin to growers and traders. As mentioned above, trading activity at this market will also benefit from facilities, such as, small warehouses, sheds, weighbridges, etc.

RESOURCE REQUIREMENT

FINANCIAL

Estimates of financial resources required for Markets are provided in Table 4-3 below.

TABLE 4-3: FINANCIAL REQUIREMENT FOR PROPOSED PROJECTS - MARKETS[35]

S.No	Project / Option	Administrative units, Agency	Project Cost (Rs. In Million)	Project Cost (US$ In Million)
RECONSTRUCTION OF MARKETS				
1.	Makeen market	Ladha, SWA	455	4.69
2.	Sara Rogha market	Ladha, SWA	270	2.78
3.	Spinkai Raghzai market	Serwekai, SWA	255	2.63
4.	Barwand market	Serwekai, SWA	255	2.63
	Maula khan Serai market	Serwekai, SWA	255	2.63
5.	Chaghmalai market	Ladha, SWA	180	1.86
6.	Jandola market	FR Tank	360	3.71
	Sub-Total		2030	20.93
ESTABLISHMENT OF SPECIALIZED MARKETS				
3.	Establishment of Fruit & Vegetable market, Wana	Wana	300	3.1
4.	Establishment of Fruit & Vegetable Market, Azam Warsak	Wana	250	2.6
	Sub-Total		**550**	**5.7**
Total			**2580**	**26.63**
Conversion Rate: Rs. 97 equals 1 USD				

[34] Market Committee will comprise of people doing business in the market to take up the role of managing affairs of the market through a participative approach.

[35] The table consists of estimated Project cost that will be finalized on preparation of detailed technical feasibility studies.

SKILLS

The local people are already well trained in trading of fruit and vegetable though they will be trained in establishing market linkages and marketing techniques.

SWOT ANALYSIS

STRENGTHS	WEAKNESSES
• Upgrading markets to provide better facilities to traders • Provide business enabling environment for private sector • Better storage facilities to reduce product loss and introduce efficiency in the value chains • Market Committees to take care of issues related to the market • Link the markets to major markets of the country through information systems - Partnership with private enterprises to make the initiatives sustainable and efficient	• High construction costs because of security concerns of contractors • Weak market linkages • Weak mechanism to control market prices and illegal hoarding of goods
OPPORTUNITIES	**THREATS**
• Creation of jobs for locals. • New Investment opportunities resulting from better facilities at the Markets • Development of strong market linkages • Cold Storage and other modern technologies/ facilities to result in increased profits to growers and middlemen related to Horticulture sector	• Security situation in the priority area as well as surrounding areas. • Lack of Investors' confidence

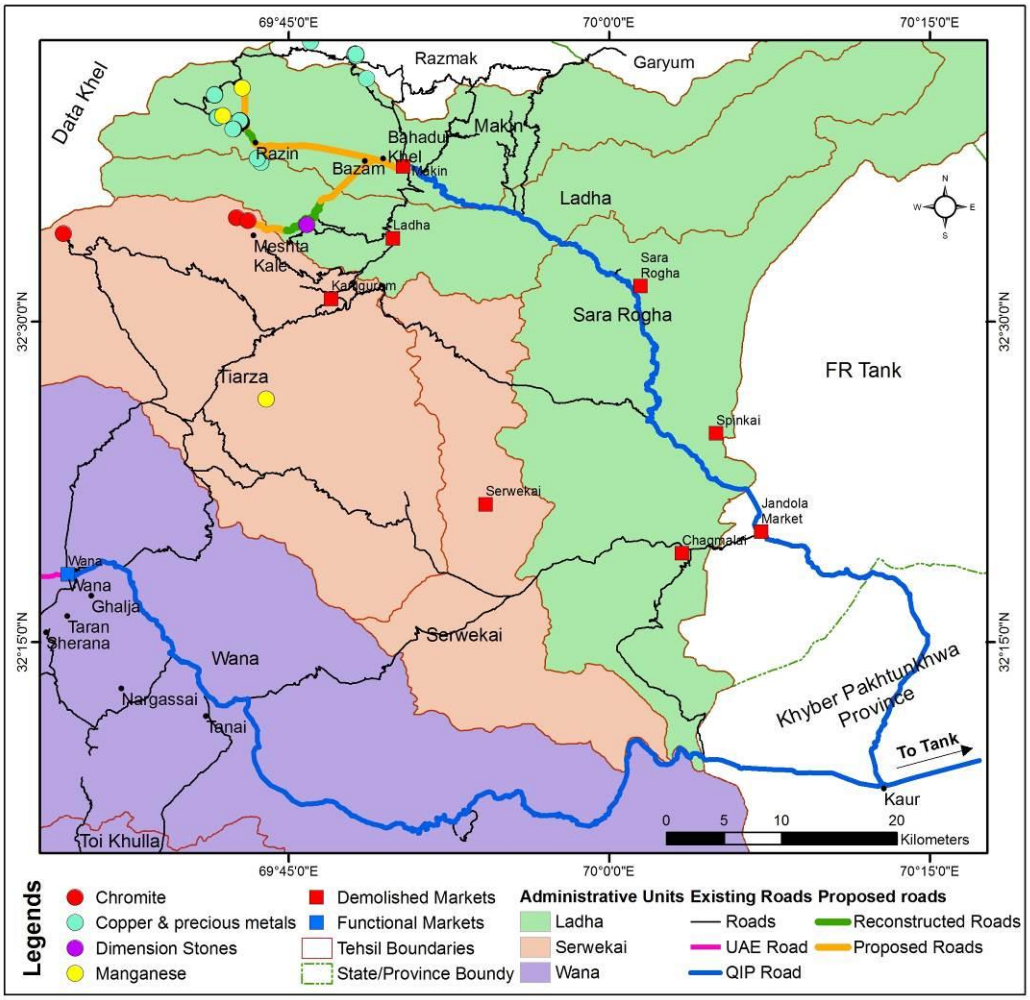
4-2-2 SUB SECTOR: ROAD INFRASTRUCTURE

Information provided here is for key mine to market and farm to market road that will facilitate development of trade across SWA.

(I) MINE TO MARKET ROADS

SWA is rich in mineral resource however activity in the extractive sector has, so far, been limited. The idea here is to develop access routes so as to facilitate the flow of minerals to the main transportation networks and markets. The proposed interventions here involve development of mine to market roads in Ladha and Serwekai sub divisions and are shown in Figure 4-4 below.

FIGURE 4-4: PROPOSED MINE TO MARKET ROADS



Source: Information secured from FDA (Mines and Minerals Section), Google Earth, USAID & Survey of Pakistan

Information on the proposed mine to market roads is provided in the Table 4-4 below.

TABLE 4-4: DETAILS OF PROPOSED MINE TO MARKET ROADS

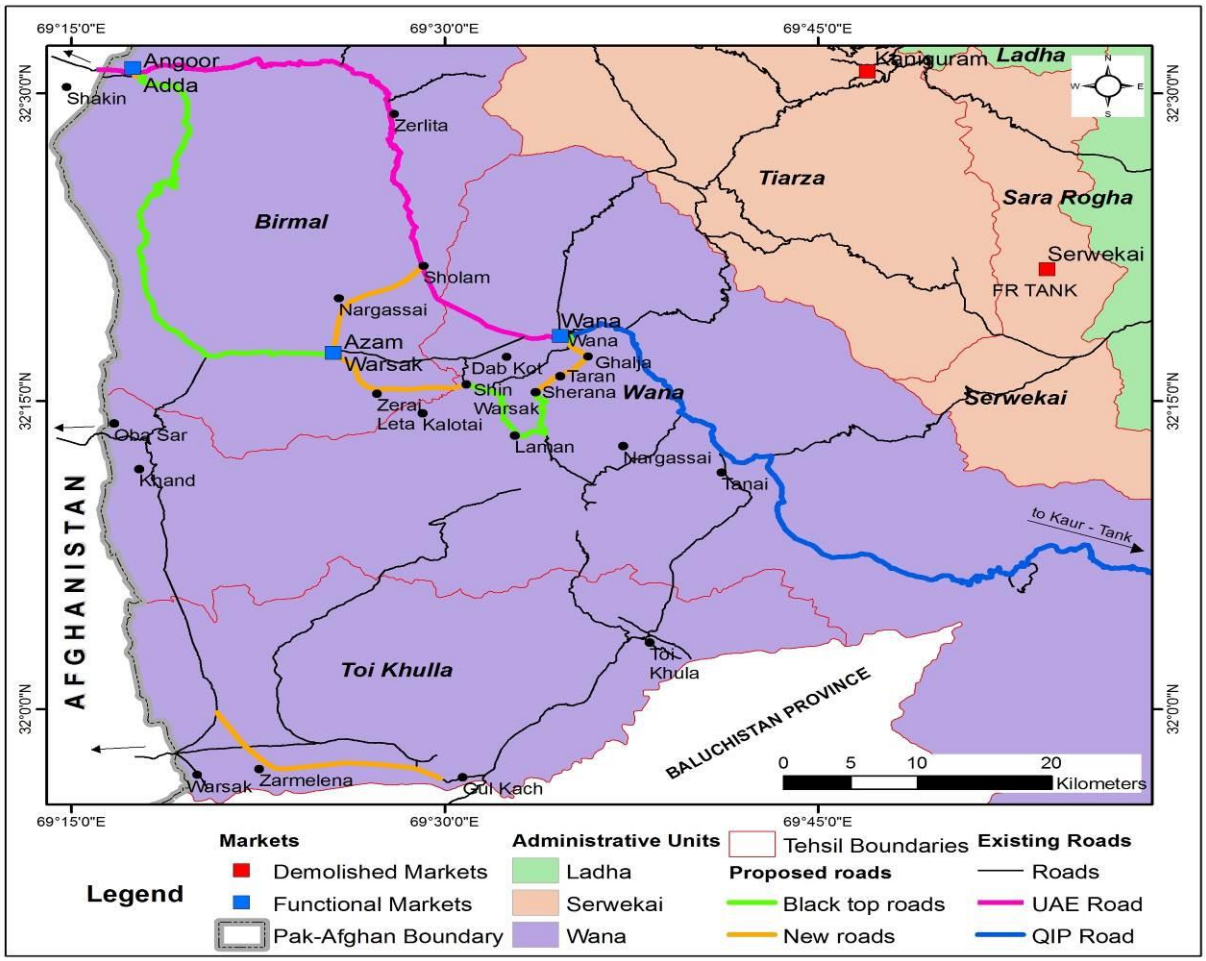
S.No	Road name	Administrative units, Agency	Length of road (Kms)	Minerals
1.	Razin to Makin road	Ladha	15	Copper and Precious stones
2.	Spinkai-Shawal to Razin road	Ladha	6	Manganese
3.	Mishta to Bazam-Bahadurkhel road	Serwekai-Ladha	20	Chromite
4.	Ghariwan-Razini to Razin-Bazam road	Ladha	3	Copper
	Total		**44**	

III) FARM TO MARKET ROADS

Major portion of the agricultural produce of SWA stems from Wana. Road connectivity across the agency has improved with FIP roads and this will be further enhanced on completion of the UAE

sponsored road from Wana to Angoor Adda. However, condition of roads providing intra village connectivity is not satisfactory and requires improvement in order to facilitate access to markets by local growers. The proposed farm to market roads are shown in Figure 4-5 below.

FIGURE 4-5: PROPOSED FARM TO MARKET ROADS



Source: Information secured from Google Earth, USAID & Survey of Pakistan

The proposed farm to market roads will link the major agricultural producing areas in the Agency to the main roads and markets nearby. This will facilitate growers and reduce post-harvest losses. Information about the proposed farm to market roads is provided in the Table 4-5 below.

TABLE 4-5: DETAILS OF FARM TO MARKET ROADS

S.No	Road name	Administrative units, Agency	Length of road (Kms)	Agriculture produce
1.	Wana-Sherena-Laman-Shin Warsak road	Wana	23	Apples, dry fruit
2.	Shin Warsak – Zereleta - Azam Warsak road	Wana	12	Apples, dry fruit, tomatoes
3.	Azam Warsak-Sera Kanda – Angoor Adda road	Wana	50	Apples, tomatoes, potatoes, dry fruit

4.	Sholam-Nargasey-Azam Warsak road	Wana	12	Apples, dry fruit
5.	Gul kach – Zurmelana – Azam Warsak road	Wana	20	Apples, tomatoes
	Total		**117**	

RESOURCE REQUIREMENT

Estimates of financial resources required for the road improvement projects are provided in Table 4-6 below.

TABLE 4-6: PROPOSED PROJECTS OF ROAD INFRASTRUCTURE [36]

S.No	Location	Sub Division	Length (Kms)	Project Cost (Rs. In Million)	Project Cost (US$ In Million)
MINE TO MARKET ROADS					
1.	Razin to Makin road	Ladha	15	450	4.64
2.	Spinkai-Shawal to Razin road	Ladha	6	180	1.86
3.	Mishta to Bazam-Bahadurkhel road	Serwekai-Ladha	20	600	6.19
4.	Ghariwan-Razini to Razin-Bazam road	Ladha	3	105	1.08
Sub-Total			**44**	**1335**	**13.8**
FARM TO MARKET ROADS					
5	Wana-Sherena-Laman-Shin Warsak road	Wana	23	690	7.1
6	Shin Warsak – Zereleta - Azam Warsak road	Wana	12	360	3.7
7	Azam Warsak-Sera Kanda – Angoor Adda road	Wana	50	1500	15.5
8	Sholam-Nargasey-Azam Warsak road	Wana	12	360	3.7
9	Gul kach – Zurmelana – Azam Warsak road	Wana	20	600	6.2
Sub-Total			**117**	**3510**	**36.2**
Total			**161**	**4845**	**49.9**
Conversion Rate: Rs. 97 equals 1 USD					

[36] The table consists of estimated Project cost and length of roads that will be finalized on preparation of detailed technical feasibility studies.

SKILLS

The initiative of rehabilitation and construction of roads can be undertaken by qualified engineering firms or the Works & Services Department. Recently, FS has been successfully implementing road improvement projects in SWA through the FWO as part of USAID's FIP. In the same manner, the proposed construction could be done through FWO and maintenance by W&S Department, FATA.

SWOT ANALYSIS

STRENGTHS	WEAKNESSES
• The proposed roads are going to facilitate trade in the agency • Reduce traveling time • Roads to mineral bearing areas will facilitate mine owners in transportation of minerals • Roads to farms will facilitate farmers in procuring inputs and marketing their produce	• High construction costs because of security concerns • High Transportation cost because of dwell time and poor condition of roads • Inconsistent road conditions heavily damaged during the period of militancy, military operations, and floods
• OPPORTUNITIES	• THREATS
• Creation of jobs for locals. • Improvement of profit margins because of reduction in transportation cost and time.	• Security situation in the Agency as well as surrounding areas. • Porous Pak-Afghan border resulting in illegal and informal trade

4-2-3 SUB SECTOR: CROSS BORDER TRADE

FATA is strategically important because of the fact that it shares a long border with Afghanistan. The geographic and economic status of Afghanistan makes it mainly dependent on produce of Pakistan or imported products transported through Pakistan. Trade between the two countries comprises of legal as well as illegal trade. It is estimated that illegal trade (smuggling) is around $ 4 billion compared to legal trade flows of $2.3 billion[37].

The major crossing points between Afghanistan to Pakistan include Torkham, Ghulam Khan, Chaman, and Nawa Pass. Torkham and Chaman (Baluchistan province) are the most advanced and most of the trade is done through these check posts. There is a need to develop other crossing points to capture the real potential of sharing border with the Afghanistan.

SWA has three main border-crossings into Afghanistan, these are at: Angoor Adda; Warsak; and, Khand. As discussed earlier, the Wana-Angoor Adda road will serve as a highway connecting SWA to Paktika province of Afghanistan. Currently, the Angoor Adda border-crossing does not have any custom facilities and development of such facilities will play a key role in encouraging trade via this route. Provided below is information on development of a customs border complex at the Angoor Adda border-crossing.

CUSTOMS BORDER COMPLEX

The Custom Border Complex would target the Infrastructure needs of the border crossing with a view towards catering to the increased flow of traffic from both sides of the border. The Customs Border Complex would include the following facilities[38]:

[37] Record of Customs Dry Port Peshawar

[38] The recommendations are based on the idea and information generated by USAID Pakistan Trade Project (PTP)

- Cargo examination areas with warehouses and special storage areas for specialized cargoes
- Secure premises (boundary wall / fencing / watch towers / gates / CCTV / lighting)
- Parking areas with lighting arrangement
- Multi-lane roads for entry and exit
- Cargo handling equipment (separate for inward and outward traffic) which includes (i) scanners, (ii) weighbridge, (iii) container stackers, forklifts etc.
- Testing laboratory and equipment for customs and SPS requirements
- Administrative building with dedicated channels for inward and outward movement with required utilities and banking services
- Communication equipment, firefighting and medical facility
- Residential accommodation for staff working at the border stations

RESOURCE REQUIREMENT

Estimates of financial resources required for initiatives regarding Cross Border trade are provided in Table 4-7 below.

TABLE 4-7: FINANCIAL REQUIREMENT FOR PROPOSED PROJECTS – CROSS BORDER TRADE[39]

S.No	Project/ Option	Agency / District	Project Cost (Rs. In Million)	Project Cost (US$ In Million)
1.	Customs Border Complex	Angoor Adda, Wana	1,500	15.5
Sub-Total			**1,500**	**15.5**
Conversion Rate: Rs. 97 equals 1 USD				

SKILLS & TECHNOLOGY

Trained professionals will be required to be stationed at Angoor Adda to deal with the modern communication, IT, security, and scanning systems. Pakistan Customs and National Database Registration Authority (NADRA) are technically capable of establishing such systems.

SWOT ANALYSIS

STRENGTHS	WEAKNESSES
• The proposed Customs Check Post will facilitate Pak-Afghan trade through the agency • It would serve as a convenient route from Indus Highway to Kabul • The distance from Angoor Adda to the main Highway in Afghanistan is within a range of 20 kilometers • Single Business Window to facilitate traders attracting more business	• Angoor Adda is not a developed trade route and having no established custom check points • Poor condition of link roads • High construction costs because of security concerns to contractors • Infrastructure to coup with heavy traffic through the crossing point
OPPORTUNITIES	**THREATS**
• Creation of jobs for locals. • Increased involvement of people in cross border trade hailing from Agency resulting in more business opportunities	• Security situation in the Agency as well as surrounding areas. • Porous border between both countries resulting in illegal and informal trade

[39] The table consists of estimated Project cost that will be finalized on preparation of detailed technical feasibility studies.

4-3 AGENCY DEVELOPMENT PLANS TRADE

4-3-1 INVESTMENT OPTIONS FOR TRADE

This section highlights investment options for the three sub divisions and adjoining areas of the SWA Agency. Investment options are presented by sub sectors in Tables 4-8, 4-9 and 4-10, below. The total value of investment proposed for trade sector interventions is US$ 92.1 Million.

TABLE 4-8: INVESTMENT OPTIONS FOR MARKETS

SUB DIVISION	IMPLEMENTING PARTNER	INVESTMENT OPTION	TIME FRAME	COST EST. (MILLION $)
Reconstruction of Markets				
Ladha, SWA	Pak Army/W&S Department (FS) / Associations/NGOs	Makeen market	1 year	4.69
Ladha, SWA	Pak Army/W&S Department (FS) / Associations/NGOs	Sara Rogha market	1 year	2.78
Serwekai, SWA	Pak Army/W&S Department (FS) / Associations/NGOs	Spinkai Raghzai market	1 year	2.63
Serwekai, SWA	Pak Army/W&S Department (FS) / Associations/NGOs	Barwand market	1 year	2.63
Serwekai, SWA	Pak Army/W&S Department (FS) / Associations/NGOs	Maula khan Serai market	1 year	2.63
Ladha, SWA	Pak Army/W&S Department (FS) / Associations/NGOs	Chaghmalai market	1 year	1.86
FR Tank	Pak Army/W&S Department (FS) / Associations/NGOs	Jandola market	1 year	3.71
Expansion/Strengthening of Markets				
Wana	Pak Army/W&S Department (FS) / Associations/NGOs	Expansion of Fruit & Vegetable market, Wana	1.5 year	3.1
Wana	Pak Army/W&S Department (FS) / Associations/NGOs	Expansion of Fruit & Vegetable Market, Azam Warsak	1.5 year	2.6
TOTAL				**26.63**

TABLE 4-9: INVESTMENT OPTIONS FOR ROADS

SUB DIVISION	IMPLEMENTING PARTNER	INVESTMENT OPTION	TIME FRAME	COST EST. (MILLION $)
Mine to Market Roads				
Ladha	Pak Army/W&S Department (FS)/ Private sector	Razin to Makin road	1.5 year	4.64
Ladha	Pak Army/W&S Department (FS)/ Private sector	Spinkai-Shawal to Razin road	1.5 year	1.86
Serwekai-Ladha	Pak Army/W&S Department (FS)/ Private sector	Mishta to Bazam-Bahadurkhel road	1.5 year	6.19
Ladha	Pak Army/W&S Department (FS)/ Private sector	Ghariwan-Razini to Razin-Bazam road	1.5 year	1.08
Farm to Market Roads				
Wana	Pak Army/W&S Department (FS)/ Private sector	Wana-Sherena-Laman-Shin Warsak road	1.5 year	7.1
Wana	Pak Army/W&S Department (FS)/ Private sector	Shin Warsak – Zereleta - Azam Warsak road	1.5 year	3.7
Wana	Pak Army/W&S Department (FS)/ Private sector	Azam Warsak-Sera Kanda – Angoor Adda road	1.5 year	15.5
Wana	Pak Army/W&S Department (FS)/ Private sector	Sholam-Nargasey-Azam Warsak road	1.5 year	3.7
Wana	Pak Army/W&S Department (FS)/ Private sector	Gul kach – Zurmelana – Azam Warsak road	1.5 year	6.2
Total				**49.97**

TABLE 4-10: INVESTMENT OPTIONS FOR CROSS BORDER TRADE

SUB DIVISION	IMPLEMENTING PARTNER	INVESTMENT OPTION	TIME FRAME	COST EST. (MILLION $)
Wana	Pak Army/W&S Department (FS)/ Customs Department	Customs Border Complex	2 years	15.5
Total				**15.5**

RECOMMENDATIONS FOR IMPLEMENTATION

The interventions proposed under the trade ADP could be implemented in coordination with partner organizations that have the technical capacity as well as presence in the agency. Local organizations' (such as, Works & Services Department, CSOs, etc.) ability to implement interventions is affected due to lack of: technical capacity; resources; and, access within the agency. In the medium term, a viable implementation partner for implementation of trade interventions could be the Pakistan Army. To date, the army has played a crucial role in: constructing FIP roads that connect the agency to the settled areas; implementing a rehabilitation program in SWA in which they have reconstructed 148 shops in Chaghmalai, Sararogha, Kotkai, Murghibad, Mandana, and Spilatoi villages; initiating a skills development program; establishing Waziristan Technical Education College at Sararogha; and, supporting local population to restart their businesses by providing them inputs for poultry farms, cattle farms, orchards, and bee farming.

Implementation of SWA ADP would require a coordinated effort by a range of stakeholders. These efforts would need to be developed in close coordination between the Pakistan Army, political administration and the local community. It would be worthwhile to consider establishment of a forum with representation of these stakeholders that can oversee the design, development and implementation of trade related interventions.

Moreover, the army could also be relied on to build capacity of local organizations so that the interventions developed here can be made sustainable. Capacity building support to W&S Department and CSOs could be provided to enhance their technical and operational abilities so that they can maintain the infrastructure that is being developed here. Also, capacity building support can be provided at the local level to market committees/associations and entrepreneurs on important business functions, such as, branding, advertising, packaging, etc.

5 POWER
5-1 POWER SECTOR OVERVIEW

5-1-1 CURRENT STATUS

Pakistan witnessed good economic performance during this decade up until the year 2007. Between the five-year period (2002 to 2007) the country emerged as one of the fastest-growing economies in Asia, with rising per capita income and improved social indicators. By 2006-7, Pakistan's Gross Domestic Product (GDP) was US$ 142.6 billion[40]. High economic growth led to commensurate increases in the demand for electricity. As a result, the country has been facing a severe energy crisis especially since the last two years as can be observed in Table 5-1 (below).

TABLE 5-1: SUPPLY AND DEMAND STATUS OF ELECTRICITY IN PAKISTAN

SUPPLY AND DEMAND POSITION OF ELECTRICITY IN PAKISTAN 2010-2020 (MW)											
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Installed Capacity[41]	18,167	18,167	18,167	18,167	18,167	18,167	18,167	18,167	18,167	18,167	18,167
Available Net Generation	14,402	14,402	14,402	14,402	14,402	14,402	14,402	14,402	14,402	14,402	14,402
Demand (Summer Peak)	19,352	20,874	22,460	24,126	25,919	28,029	30,223	35,504	34,918	37,907	41,132
Surplus/Deficit Generation	-4,849	-6,371	-7,957	-9,623	-11,416	-13,526	-15,720	-21,001	-20,415	-23,404	-26,629

Source: Private Power Infrastructure Board

Electricity demand in the country is met by power generated from national mixed power generation plants owned either by WAPDA or by Independent Power Producers. At present the rated electric power generating capacity in Pakistan is 18,167 (MW) with demand growing at ten percent annually the estimated shortfall for the year 2013 is 9,623 MW.

POWER SECTOR IN FATA

Electrification of FATA started in 1960 and has gradually been extended to all agencies. Poor electricity service remains a key constraint for growth of economic and industrial activities across FATA. Electricity is provided at a subsidized flat rate to consumers without electric metering system[42]. Frequent power breakdowns, low voltage, heavy line losses remain as challenging issues for the power sector across FATA. The total number of electric connections as of 2011-12 was 440,062[43].

CONDITION OF POWER DISTRIBUTION NETWORK IN FATA

TESCO is responsible for constructing, operating and maintaining power distribution facilities within FATA. Electricity supplied to FATA, including SWA, is through the National Grid. TESCO has an integrated secondary transmission system consisting of 132 kV, 66 kV and 33 KV transmission lines and grid stations for receiving the power from the primary transmission network. Currently, 1,511 villages of FATA, out of a total of 2,524 villages, can receive electricity. This translates into overall electricity supply coverage of about 60%.[44]Details of TESCO's transmission lines and grid stations are provided inTable5-2 (below).

[40] World Bank Report on Electricity Distribution and Transmission Improvement Project, pg. 1 May 22,2008
[41] WAPDA Statistics Report July 2010. Pakistan
[42] FATA Sustainable Development Plan 2007–2015
[43]TESCO Briefing to Functional Committee on Problems of Less Developed Areas
[44]FATA Digest of Mega Projects

TABLE 5-2: STATUS OF POWER DISTRIBUTION NETWORK

STATUS OF LINES AND GRID STATIONS IN TESCO										
	LINES (km)						GRID STATIONS (Nos.)			
	132KV	66KV	33KV	11KV	LT	Total	132 KV	66KV	33KV	Total
TESCO	259	383	805	6,339	6,368	14,154	19	17	0	36

Source: State of the Industry Report 2012 NEPRA

The unregulated power usage and un-metered supply in FATA has caused overloading across the distribution system. Due to this, TESCO is forced to undertake excessive round the clock load management. According to TESCO officials, the organization was forced to carry out daily load shedding between 12 to 16 hours in June and July of 2010[45]. Heavy line losses of approximately 22 percent have been recorded throughout 2011 and are another serious challenge for TESCO.[46]

In order to improve and enhance the power distribution infrastructure across FATA, TESCO intends to develop a master plan. The master plan will provide guidance to TESCO on what reforms and infrastructure investments it will need to make in order to provide safe and reliable distribution of electricity. This activity has yet to be initiated and has been delayed due to administrative constraints.

EXISTING SITUATION OF POWER INFRASTRUCTURE & AVAILABILITY IN SWA

Access to detailed and updated data on the level of electrification of villages in SWA is difficult to obtain due to the prevailing security situation. According to Secretary TESCO, by December 2012, 416 SWA villages had access to electricity, which is considerably more than 2008-9, when the corresponding figure was 311 villages. In 2008-9, approximately 39,000 connections were provided consisting of 31,000 domestic, 4,200 commercial and 3,500 connections for irrigation purposes.

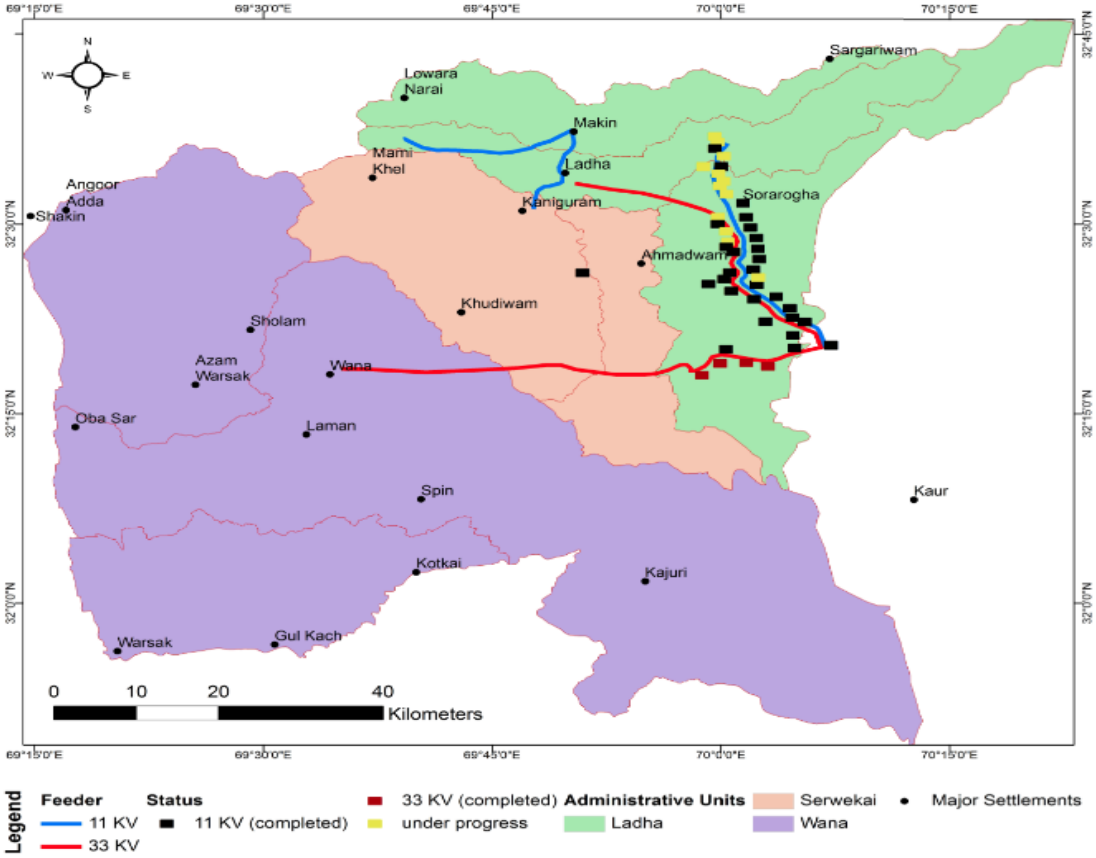
Based on interviews and discussions with TESCO management FATA Secretariat (FS) and FATA Development Authority (FDA), at present, approximately 25percent of the households in SWA have access to the national electricity grid. This is primarily due to the significant damage caused to the grid as a result of the militancy and military action.

The figure 5-1 (below) shows the existing power infrastructure in SWA as well as the transmission line networks that are currently being developed. The level of electrification is most extensive in administrative unit of Ladha and consists of 11 kV and 33 kV distribution lines. This is followed by administrative unit of Serwekai which primarily contains 33 kV lines. As mentioned earlier, Wana's power infrastructure has been seriously affected by the conflict and only has a single 33 kV line running through it.

[45]Consultant's interviews with TESCO Officers

[46]TESCO Briefing to Functional Committeeon Problems of Less Developed Areas.

FIGURE 5-1:ELECTRICITY DISTRIBUTION NETWORK IN SWA



Source: Data secured from map from TESCO and USAID

5-1-2 INSTITUTIONAL FRAMEWORK

NATIONAL TRANSMISSION AND DISPATCH COMPANY (NTDC)

NTDC is a public sector company that came into being as a result of restructuring of WAPDA in 1998. It is in charge of operating the transmission system (220-kV and 500-kV network) and performing the dispatch function in Pakistan. Transmission and distribution below 220 KV is the responsibility of TESCO.

WATER AND POWER DEVELOPMENT AUTHORITY (WAPDA) & PAKISTAN ELECTRIC POWER COMPANY (PEPCO)

WAPDA was created in 1958 as a Semi-Autonomous Body for coordinating and giving a unified direction to the development of schemes in Water and Power Sectors. Since October 2007, WAPDA has been bifurcated into two entities i.e. WAPDA and PEPCO. WAPDA is responsible for water and hydropower development whereas PEPCO is vested with the responsibility of thermal power generation, transmission, distribution and billing. WAPDA is now fully responsible for the development of hydropower power projects in the country including the FATA region. In October 2010, PEPCO was disbanded, after it faced huge losses and debts.

TRIBAL AREA ELECTRIC SUPPLY COMPANY (TESCO)

Previously, electrification in FATA was undertaken by WAPDA. In 1998, the Peshawar Electric Supply Company Limited (PESCO) took the responsibility of power distribution in FATA, which is one of the ten electricity distribution companies (DISCOs). TESCO was spun out of PESCO as a public limited company incorporated in Pakistan under Section 32 of the Companies Ordinance, 1984. TESCO started functioning in August 2004.

Based in Peshawar, administratively TESCO is divided into one circle, four operational divisions, one construction division, one industrial division and one SS& TL division. Currently, 1400 employees

are working in TESCO to operate and maintain power distribution network. The organization has made financial losses consistently since its inception and the company has been dependent on Government subsidy for its survival.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY (NEPRA)

NEPRA is responsible for regulating electricity across the country. NEPRA was established in December 1997 to develop and pursue a regulatory framework, which ensures the provision of safe, reliable, efficient and affordable electric power to the electricity consumers. NEPRA's main responsibilities are to issue licenses for generation, transmission and distribution of electric power, establish and enforce standards to ensure quality and safety of operation and supply of electric power to all consumers connected to the national grid.

PRIVATE POWER AND INFRASTRUCTURE BOARD (PPIB)

PPIB was created in 1994 to facilitate private sector in the participation of power generation in Pakistan. The role of PPIB is to provide "One-Window" facility to private investors. PPIB also provides support to the power purchaser and fuel supplier while negotiating the various power agreements. It is also responsible for liaison with the concerned local and international agencies for facilitating and expediting progress of private sector power projects.

MINISTRY OF FINANCE (MOF)

The MOF plays a key role in the areas related to the financial aspects of the power sector - MOF is responsible for subsidy policies, investment support, financial restructuring of state owned power companies, financial guarantees to investors and creditors, etc.

FATA SECRETARIAT (FS)

FS was set up in 2002 and provides a dedicated administrative office for administrative, planning and development issues relating to FATA. It is headed by Additional Chief Secretary and assisted by a number of Secretaries and Directors. Project implementation is carried out by line departments of the secretariat. In 2009, FS installed 67 different mini/micro/hydel projects in Khyber Agency.

FATA DEVELOPMENT AUTHORITY (FDA)

FDA was established in 2006 and its mandate is to plan and execute sustainable development projects in the assigned sectors, with a major focus on developing projects based on Public Private Partnerships.[47] In 2009, FDA completed a solar energy project in eight different agencies/FRs.

5-1-3 REGULATORY FRAMEWORK

POWER POLICIES INTRODUCED BY GOP-MOWP

POWER POLICY 1994

This policy helped in overcoming load shedding in the country by attracting over $5 billion in investment and contracting about 4,500 Megawatts of private generation.

HYDEL POLICY 1995

In 1995, under this policy, the Ministry of Water & Power announced to shift power generation from imported fuels to cheap hydropower.

[47] *http://www.FATAda.gov.pk/About-FATADa.php*

TRANSMISSION LINE POLICY 1995

In order to focus on reducing the considerable line losses that, at the time, were running at 35%, GOP introduced this policy. It provides incentives to the private sector to develop transmission lines & Grid Stations above 220 KV.

POWER POLICY1998

This power policy offered additional incentives to investors through the Built-Own-Operate-Transfer (BOOT) model.

REGULATION OF GENERATION, TRANSMISSION AND DISTRIBUTION OF ELECTRIC POWER ACT, 1997

This act established an entity, NEPRA, to develop and pursue a regulatory framework for ensuring safe, reliable, efficient and affordable electric power to the electricity consumers.

5-1-4 GOP'S DEVELOPMENT STRATEGY

Provided below are details of the government's development strategy as they relate to the power sector.

- **FATA Sustainable Development Plan (SDP) 2007–2015.** SDP clearly notes that electrification from the national grid is the responsibility of TESCO. It proposes Mini Hydropower Plants for remote areas with no access to the National grid and allocates a budget of 1,118. Million PKR for development of 450 Mini Hydropower units with 418 million PKR allocated for 2012-15[48]. An allocation of 4,325 million PKR has also been made for conducting feasibility studies and construction of 20 small dams with 2,165 million PKR specifically allocated for 2012-15.
- **Annual Development Program (ADP).** In the 2012-13 ADP, FS has not allocated funds for any new development programs either for rural electrification or for construction of any grids. As is shown in Table 5-3 (below), allocations are made in the ADP only for 16 ongoing schemes. Apart from continuation of projects on rural electrification through providing Solar PV to villages in FATA, 10 million PKR are also allocated for the development of the Chao Tangi Small Sam in SWA.

In addition to the above projects, FS has identified a number of mini and micro hydel project sites for FATA and SWA. According to FS, the next steps will be development of feasibility studies and allocation of funds. Similar projects have already been implemented in FATA. Preliminary studies have been carried out to identify potential sites for hydel generation on a larger scale. Detailed feasibility studies are planned for the 121 sites already identified for small dams, to assess their potential for hydel generation.

5-1-5 DONOR ASSISTANCE STRATEGY

Currently, USAID is providing support to FS and WAPDA for rehabilitation of damaged power infrastructure in SWA.As a result of these activities mentioned above, it is expected that electricity distribution will be improved to approximately 18 thousand people. The expected enhancement as a result of the measures described above will be improvement of the quality of electricity available to the communities of SWA i.e. adequate voltage level to operate appliances. In addition, as a result of the rehabilitated power infrastructure described above, the reliability of the electricity supply will also

[48] FATA Sustainable Development Plan 2007-2015 Table 23 pg 75

be considerably improved, resulting in considerable reduction in the down time of the grid and/or transmission lines for repairs.[49]

Also, the Deutsche GesellschaftfürInternationaleZusammenarbeit (GIZ) - Germany provided financial and technical assistance to WAPDA in exploring hydropower potential in the FATA region[50].Furthermore, the Asian Development Bank as part of its "Pakistan Power Distribution Enhancement Investment Program" is supporting power distribution system improvements across all eight electricity distribution companies so as to reduce line losses from 33% to 10%[51].

[49]Presentation by USAID on North & South Waziristan Agencies, May 2011.

[50] ibid

[51]Pakistan: Power Distribution Enhancement Investment Program (Multitranche Financing Facility), ADB Annex I pg 26

5-2 POWER OPPORTUNITY ASSESSMENT

SUB-SECTOR SELECTION

The two sub-sectors of the power sector this assessment will analyze are:

- **Power Generation.** Two types of power generation options are analyzed here – Large Multi-Purpose Hydropower Projects and Mini Hydropower Plants.
- **Rural Electrification.** Here, opportunities related to rural electrification have been explored.[52]

5-2-1 SUB SECTOR: POWER GENERATION

MARKET POTENTIAL

In SWA, majority of the village communities have access to only one to two hours of electricity throughout the day. This situation can be remedied through the utilization of the favorable terrain existing in large parts of the agency for development of hydropower generation units of various capacities.

LARGE MULTI PURPOSE HYDROPOWER PROJECTS

The Gomal Zam dam and Dhana irrigation scheme projects are in progress with the support of USAID. The Gomal Zam dam project is nearing completion with an installed power generation capacity of 17.4 MW. This project is expected to play a small part in reduction of the existing energy shortfall in the country while also improving the irrigation infrastructure in SWA. However, it is likely that power generated from this project will be exported to the national grid for distribution to the priority areas of the country as per standard operational modality of WAPDA. Thus, it is unlikely that situation of SWA as it relates to access to electricity will improve as a result of this project.

Given that no other large scale hydropower projects in SWA are currently under consideration, it appears that in the medium term it will be more feasible to consider development of small scale or mini hydropower projects.

MINI HYDROPOWER PLANTS

Details of funds allocated for hydropower development in FATA SDP for 2007-15 are provided in Section 5-4 above. In addition, FDA's plan for 2012-13 also allocates 600 million PKR to develop Chao Tangi small dam project in SWA. While these plans might appear overly ambitious, they are also quite promising as they convey the intent and realization of the relevant Government authorities for the need to develop and install small scale hydropower projects as a sustainable solution to overcome the energy shortfall within SWA.

According to FS, between 1970-71 and 2011-12, only 14 micro hydel power generation units were installed in SWA that had a total installed capacity of 40 kW, benefitted 95 households and cost 6.44 million PKR. In the development context, this is an insignificant number of installations considering the time span of four decades over which these installations were conducted and the increasing power demand within the agency.

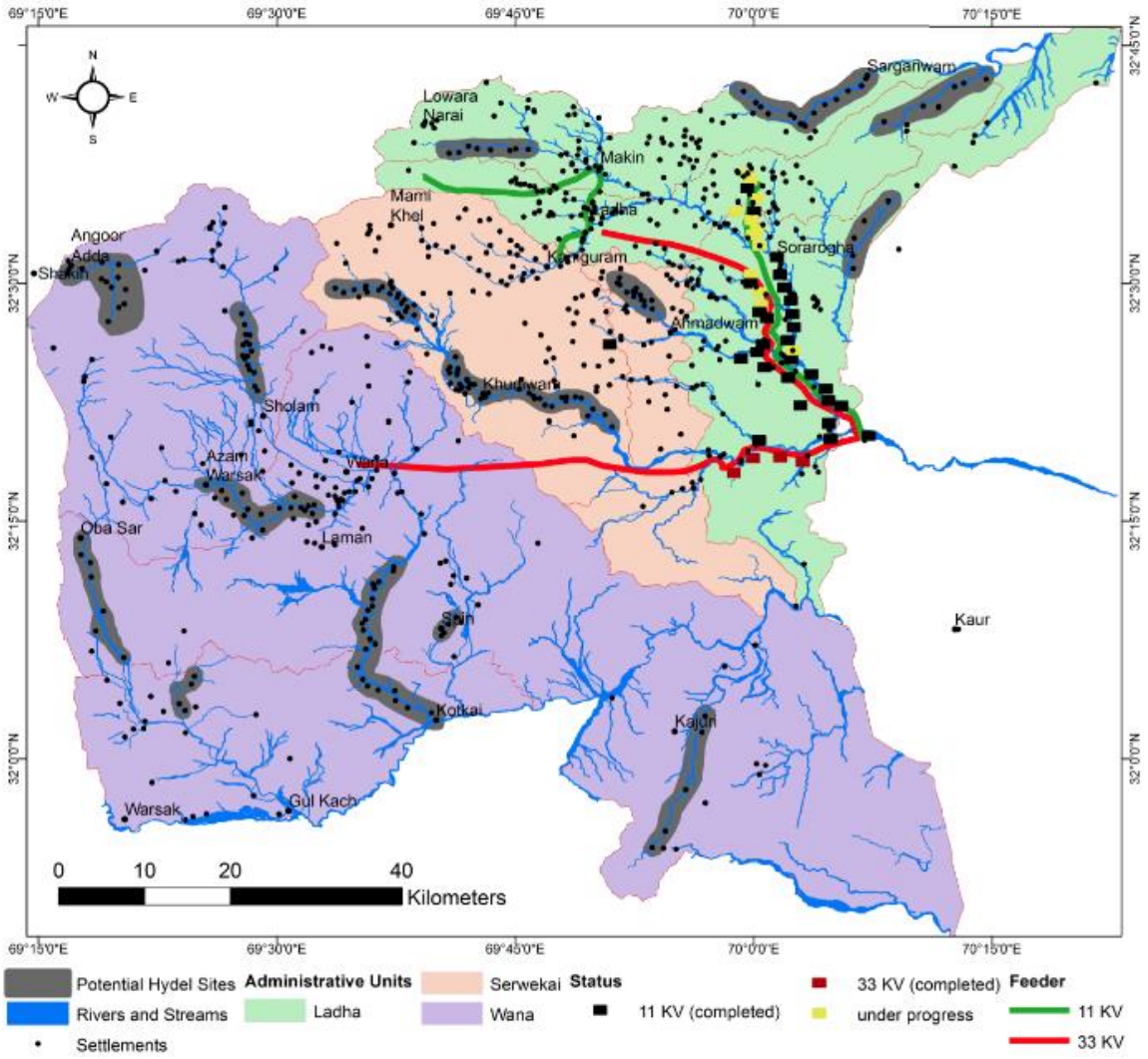
[52]Opportunities related to investments in power infrastructure (such as, grid stations, transformers, etc.) are not included here. This is due to the fact that TESCO is in the process of developing a Master Plan, which will provide guidance as to the location and scale of such investments.

According to FDA, a total of 13 sites have been identified that include eight 'perennial flow' sites for development of small irrigation dams in SWA. The details of all 13 sites are provided as Annexure 5-1.

In view of the existing energy scenario in SWA, the required technical assessments to consider the possibility of power generation at the irrigation dam sites needs to be conducted on an urgent basis. Also, even if majority of the irrigation dams are capable and subsequently utilized for power generation, a major proportion of the remotely located communities in SWA shall remain without access to power due to the limited electricity distribution network.

In order to effectively and efficiently manage this issue, a detailed strategy needs to be formulated that focuses on identifying and developing community managed 'run of the river' micro hydel projects at all suitable locations across the three administrative units of the agency. Potential sites within the three administrative units of SWA where development of micro hydel projects should be explored is provided in Figure 5-2(below). In addition, the strategy should also provide identification and utilization of any 'low head sites' for development of micro hydel stations. Furthermore, as part of the strategy, pilot projects would be identified and developed and subsequently monitored. The capacities of the local communities would need to be developed and implementation of financial modalities ensuring sufficient fund collection from the communities for required O&M of the projects would need to be ensured.

FIGURE 5-2: POSSIBLE SITES FOR MICROHYDEL PROJECT DEVELOPMENT



Source: Data developed from map from TESCO and USAID

As part of the first 'pilot' phase, the development of 50 micro hydel power projects in each of Serwekai, Wana and Ladha with generating capacities of 15 Kilo Watts each could be conducted. This installed capacity from each turbine should prove sufficient for electrification of 40 houses, while also providing sufficient electricity for the establishment of small-scale community based business enterprises. Thus, during the first phase alone, 6,000 households would be provided with a sustainable and reliable supply of electricity for the long term.

It should be mentioned here that the practicality and effectiveness of this approach can be assessed by the successful development of 67 small hydel power units in Khyber agency of 6 kW each, being efficiently managed and maintained by the village communities.

The SWOT analysis for this proposed intervention is provided in Box 5-1 (below).

RESOURCES REQUIRED

FINANICAL

The cost of development of micro hydel plants is provided in Table 5-3(below).

TABLE 5-3: MICRO HYDEL PLANT-COST

S/No.	Size of Plant (kW)	Mechanical Components Per Plant	Electrical Components Per Plant	Civil Work Per Plant	Transmission Line Per Plant	Capital Cost per Plant (million PKR)	Capital Cost per Plant (USD)[1]
1	5	0.22	0.04	0.32	0.36	0.94	9,690
2	7.5	0.32	0.06	0.32	0.36	1.06	10,930
3	10	0.43	0.08	0.32	0.36	1.19	12,270
4	12	0.52	0.10	0.32	0.36	1.30	13,400
5	15	0.65	0.12	0.32	0.36	1.45	14,950
6	20	0.86	0.16	0.32	0.36	1.70	17,530
7	24	1.04	0.19	0.32	0.36	1.91	19,690
8	30	1.30	0.24	0.32	0.36	2.22	22,890

Source: PCRET Report on MHPs

1: Exchange rate 1 USD = 97 Pak Rupees

MARKETING

A detailed dissemination strategy will need to be developed keeping in mind the key target groups, in this case being the communities of the villages in SWA along with the existing and potential business individuals/enterprises. These key target groups would need to be educated regarding the mode of operation and limitations of the hydropower technology as well as the potential benefits that can be derived from it. This will be vital, both in fulfilling the energy requirements of the households as well as the economic benefits to be derived from adopting this technology.

SKILLS &TECHNOLOGY

Firstly, the local technical personnel would need to be trained in operation and maintenance of the hydropower turbines and associated equipment being installed at the different communities to avoid operational issues. Furthermore, any technical personnel and/or existing/potential business entrepreneurs interested in developing their enterprise(s) in the hydropower sector would need to be trained in designing and construction of hydropower units and/or in repairing and providing O&M services for the equipment and machinery to be installed.

At a later stage, the possibility of providing trainings to selected personnel from the communities in fabrication of different small hydropower turbines could also be considered and started by communities as a profitable and self-sustaining business venture.

INFRASTRUCTURE

The raw materials required for development of the hydropower units, particularly the civil structures such as steel piping, concrete, bricks and cement would be required along with the turbine itself, which would need to be readily available, ideally through the development of local vendors offering these items. In addition, local entrepreneurs/businesses would need to be developed and supported by Government administration and local Community Support Organizations (CSOs).

BOX 5-B-1 SWOT ANALYSIS – MINI HYDROPOWER PLANTS

STRENGTHS	WEAKNESS
• Proven and reliable technology • Low operating and maintenance costs • Short duration for development of project of approx. 3-6 months • Considerable technical expertise in the country for repair and maintenance of hydropowerplants • No reservoir required for 'run of river' projects • Green technology with no toxic emissions	• One time high capital cost • Lack of suitable financial avenues available to communities for installation of micro hydel projects. • Lack of technical capacities amongst local communities to adequately manage the units • Vulnerable during high rainfall and flash floods • Dependent on sufficient flow of water to operate turbine
OPPORTUNITIES	**THREATS**
• Provision of electricity to remote locations • Development of capacity of local community members in O&M of hydropower plants • Possibility of small-scale income generation activities through the electricity • Possibility of promoting education by enabling students to study in the evenings • Local businesses could be developed selling electrical accessories such as light bulbs, switches, sockets etc.	• Turbulent and highly volatile security situation • Rapidly increasing costs for construction materials and equipment. • Failure of installed hydropower units due to lack of proper operation and management of the units by the operators/communities. • Multiplier effect amongst communities of installing these units does not take place due to poor O&M by communities.

5-2-2 SUB SECTOR: RURAL ELECTRIFICATION

MARKET POTENTIAL

At present, 40 MW of Renewable Energy (RE) is produced in the country which is about 0.21% of the total installed generation capacity. The RE being produced in the country is primarily being used at present for off-grid applications such as electrification of remote villages located far from the local grid. An investment potential of over USD 16 billion dollars for the short to medium term exists in the country to develop both off-grid as well as large scale grid-connected RE technology based installations.

SWA holds immense potential for utilization of RE resources to meet the energy needs of its communities, particularly those that are located far from the grid. Provided next is information on exploiting SWA's RE resources through biogas units and Solar PV (Solar Photovoltaic) technology.

Also, the possible small scale 'electricity based' businesses which can be developed as a result of the rural electrification for communities of SWA are provided as Annexure 5-2.

SUB SECTOR: RURAL ELECTRIFICATION - BIOGAS

At present, considering the scarcity of livestock in the agency, this proposed intervention does not appear feasible, despite its immense potential. However, in order to ensure the development of a sustainable rural electrification program in the future; 'livestock farms' must be established, thus guaranteeing a minimal quantity of manure as raw material for this technology. This is critical, considering the livestock that has survived the conflict is pastoral and not confined within the household compound, making manure collection extremely difficult. Furthermore, all relevant information for development of a 'biogas based' rural electrification intervention is provided in the following sections to facilitate the development of a suitable program when appropriate in the future.

Prior to the conflict, on average, 10 to 12 goats and sheep and 4 to 5 cows were reared per household in SWA. However, most of the households of SWA have lost most of their livestock holdings due to the conflict. The specific requirements of animal manure required for biogas production and associated fuel wood savings are provided in Table 5-4(below).

TABLE 5-4: SMALL SCALE BIOGAS PLANT SPECIFICATIONS

S.No	Plant Capacity (m^3)	Daily Gas Production (m^3)	Fresh dung required every day (kg)**	Daily Water Requirement (litre)	Capital Cost (PKR)	Capital Cost (USD)	Quantity of Fuel Wood saved per day (kg)
1	4	0.8-1.6	20-40	20-40	80,000	825	4 to 8
2	6	1.6-2.4	40-60	40-60	100,000	1,030	8 to 12
3	8	2.4-3.2	60-80	60-80	120,000	1,240	12 to 16
4	10	3.2-4.0	80-100	80-100	150,000	1,550	16 to 20

Note: * Capacity of plant is volume of digester and gas storage volume
** Average Retention time: 50 days
Source: RSPN report on Biogas Installations in Pakistan, 2010.

In the future, utilization of biogas technology would prove very relevant with the biogas generated providing dual functionality. Depending on the livestock holdings and subsequent amount of biogas generated, it could be used for generating electricity through gas powered generators or even for meeting the energy needs of the households, namely cooking and heating.

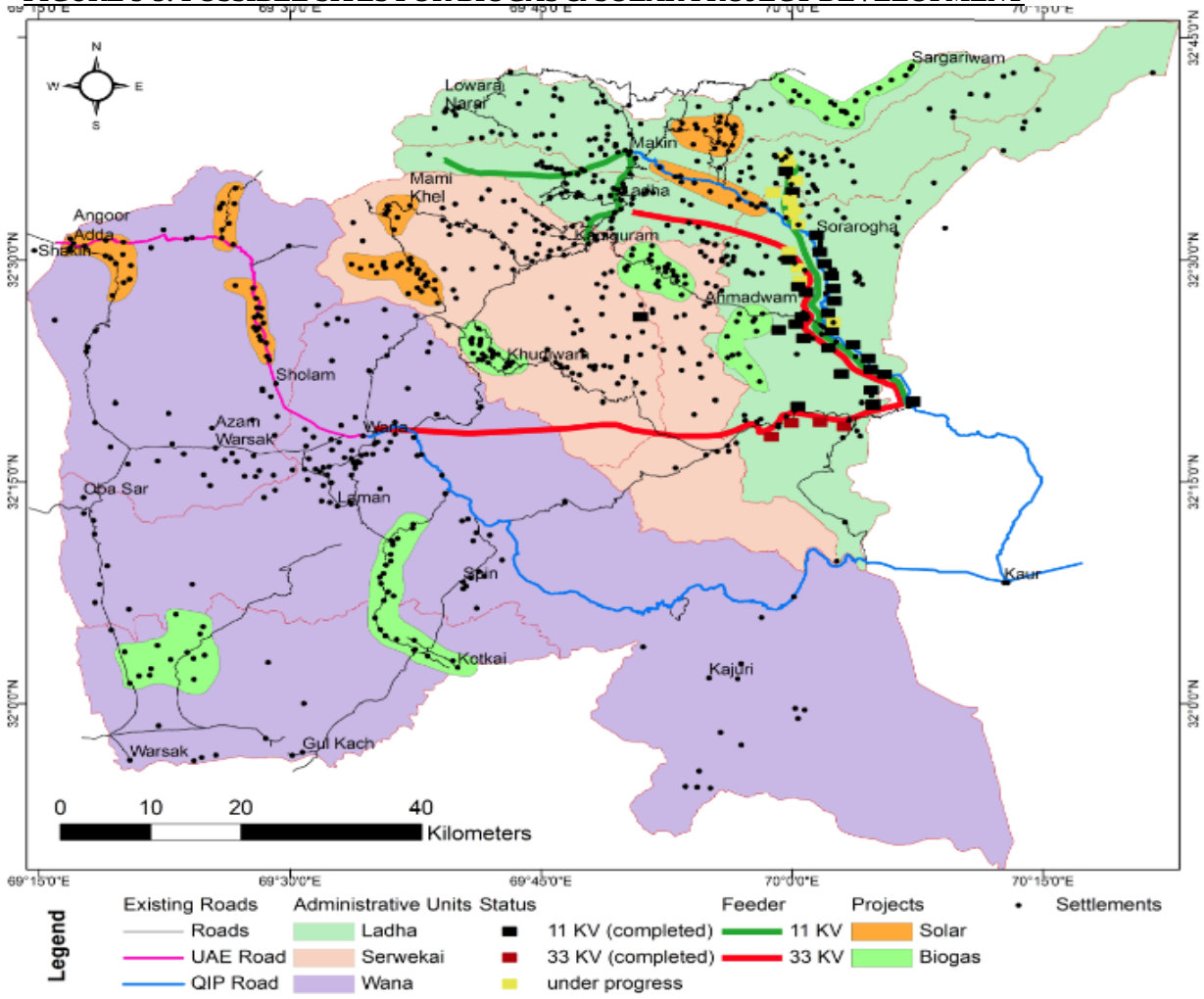
Biogas projects are being implemented within the country through the collaboration of local and international development organizations such as RSPN, Winrock International and SNV. So far, over a hundred thousand households in Punjab province alone have been provided with their own biogas units. These projects are being successfully managed by utilizing the manure available from the available livestock as raw material for the biogas units. This in turn provides the households with biogas as well as compost as the end product, which also enables them to improve the fertility of their agricultural fields.

Biogas program presently being implemented within the country were meant initially to only cater to the energy needs of households by providing 'small scale' biogas units. However, based on the success of these pilot projects, this program has now been expanded in its scope. It is now focusing on areas with a large number of cows available, primarily rural settings where the communities are willing to pool their livestock resources to manage a biogas unit and obtain electricity. In addition, even commercial enterprises such as dairy farms are being offered this technology option to generate electricity using dual fuel powered generators.

A possible approach for developing and implementing biogas programs could involve leveraging existing livestock, preferably cows (waste from sheep/goats has to be pre-treated prior to feeding into the digester unit), and having village communities jointly manage and operate the biogas units. However, in areas where households are scattered, a 'jointly managed' biogas unit cannot be developed, then a small scale household biogas units can be contemplated. These smaller units can be similar to those already installed in Punjab.

Potential sites within the three administrative units of SWA where development of biogas and solar projects could be explored is provided in Figure 5-3(below).

FIGURE 5-3: POSSIBLE SITES FOR BIOGAS & SOLAR PROJECT DEVELOPMENT



Source: Data developed from map from TESCO and USAID

Lastly, an efficient and sustainable financing mechanism needs to be developed and implemented at the village locations where the biogas units will be installed to ensure the ownership of the

communities. This in turn will also make sure that O&M of the installed systems will take place as required.

RESOURCES REQUIRED

FINANICAL

The capital costs associated with installation of the biogas units and generators for the different capacities are provided in Table 5-5(below).

TABLE 5-5:ANIMAL WASTE REQUIREMENTS FOR POWER GENERATION

Options	Animals Required (Cows/Buffaloes)	Volume of Digester (m^3)	Units of Electricity Generated (kWh)	Capital Cost (PKR)	Capital Cost (USD)
1	20-25	25	16	700,000	7,220
2	40-50	50	32	12,00,000	12,370
3	80-100	100	64	17,00,000	17,530

Note: 1: Conversion Rate 1USD = 97 PKR
Source: Interviews conducted with Mr Prem Sagar, Biogas Expert for Winrock International

MARKETING

A detailed dissemination strategy will need to be developed keeping in mind the key target groups, in this case, village communities in SWA. These key target groups would need to be educated regarding the biogas technology, its mode of operation as well as the potential benefits that can be derived from it.

SKILLS &TECHNOLOGY

The local masons and any existing/potential business entrepreneurs interested in developing their enterprise(s) in the biogas sector would need to be trained in designing and construction of biogas units.

INFRASTRUCTURE

The raw materials required for development of the biogas units i.e. bricks, cement, piping, steel for dome construction, dual fuel electricity generators etc.

BOX 5-2SWOT ANALYSIS - BIOGAS

STRENGTHS	WEAKNESS
• Proven technology and standardized design • Simple mode of operation, which does not involve any mechanically moving parts • Minimal operating and maintenance costs • By-product of biogas unit is compost • Dual functionality - electricity and heating for cooking needs • Short duration - one week for construction and installation of biogas unit & equipment • Robust design with unit installed below ground, thus ensuring longevity, even in a turbulent area such as SWA • Increasing familiarity and technical expertise in the country of biogas technology	• Lack of suitable financial avenues available to communities for purchasing of the biogas units and associated equipment such as generators. • Lack of awareness and familiarity amongst local village communities regarding this technology resulting in trust deficit about effectiveness of technology. • Lack of technical capacities amongst local communities to adequately manage the units. • Minimum livestock/manure requirements to effectively operate the biogas units might not be fulfilled by certain households/village communities after years of conflict due to depleted livestock, despite willingness to adopt and use the technology for their benefit.

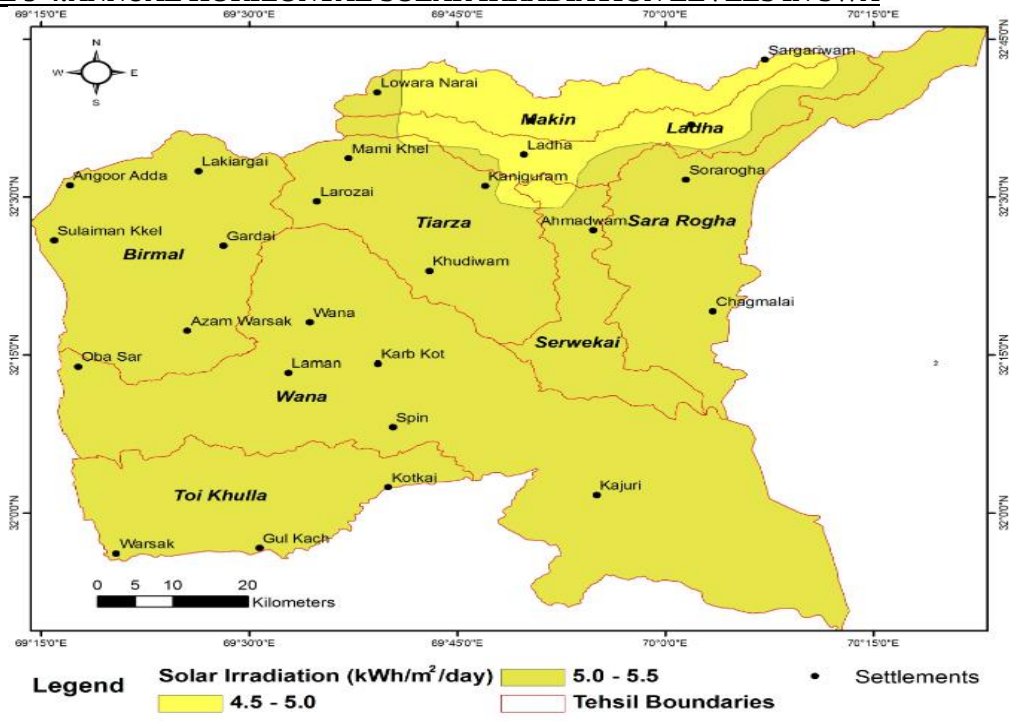
OPPORTUNITIES	THREATS
• Provision of obtaining electricity and/or fulfilling heating and cooking needs of communities • Development of capacity of local community members in O&M of biogas plants • Use compost being produced as byproduct of biogas unit for increasing productivity/yield of crops • Possibility of initiation of small-scale income generation activities through electricity • Possibility of promoting education by enabling students to study in the evenings • Local businesses could be developed selling biogas unit accessories	• Turbulent and highly volatile security situation within SWA • Religious extremists in SWA might not allow utilizing animal waste for electricity generation • Increasing costs for construction materials & equip. • Failure of installed biogas units due to lack of proper operation and management of the units by the operators/communities. • Multiplier effect amongst communities of installing these units does not take place due to poor O&M amongst communities.

SUB SECTOR: RURAL ELECTRIFICATION - SOLAR PV

SWA enjoys high levels of solar irradiation throughout the year (4.5 kWh/m^2/day on average), making it a key area for deployment and utilization of renewable energy based technologies as can be observed from Figure 5-B-3(below). Considering this enormous potential in this area, so far negligible number of electrification through Solar PV technologies exist.

As part of FS's plans, 270.8 million PKR have been allocated as part of four phases of providing solar PV to the various villages in FATA[53]. However, majority of these funds remain unspent (and have been utilized for other projects), both due to delays in implementation of this critical intervention as well as due to the consistent turbulence in the security situation of the area.

FIGURE 5-4:ANNUAL HORIZONTAL SOLAR IRRADIATION LEVELS IN SWA



Source: Map of Solar Irradiation levels developed jointly by USAID and NREL

Provided below are four activity options for exploiting Solar PV in SWA.

[53]FATA Secretariat ADP for 2012-13.

Activity A: Installation of Off-grid 'stand-alone' Solar PV systems for individual households in the SWA village communities

Activity B: Solar PV powered tube wells for extraction of water, both for agriculture and also for obtaining drinking water

Activity C: Solar PV street lights

Activity D: Solar PV lights in markets

Provided below are some key issues that need to be considered here:

- Ensure that the villages furthest from the grid are provided solar PV systems at the earliest.
- Designing of solar PV units so it caters to the needs of communities.
- Utilize and incorporate lessons learnt from solar PV rural electrification projects developed in Tharparkar, Sindh and other locations during development and implementation of strategy for Solar PV deployment in SWA.
- Develop a financing mechanism to cover system O&M costs.

Also, key additional information on development of Solar PV in SWA is provided as Annexure 5-3.

RESOURCES REQUIRED

FINANICAL

Similar to the proposed biogas electrification program, a phase wise approach is recommended based on established criteria for prioritization of the village communities where the Solar systems as well as tube wells and street lights would be installed. The costs for Solar PV systems of various capacities and for specific applications, obtained as a result of a brief market survey of solar equipment vendors in the local market, are provided in Table 5-6 (below).

TABLE 5-6:COSTS OF SOLAR PV SYSTEMS

Possible Activities	System Capacity (Watts)	Household size (numbe of rooms)	Appliances to be operated	Capital Cost (PKR)	Capital Cost (USD)[1]
Activity A: Standalone Household systems					
1	60	1	1 LED/CFL light, 1 DC fan	60,000	620
2	80	2	2 LED/CFL lights, 1 DC fan	80,000	830
3	120	3	3 LED/CFL lights, 1 DC fan	120,000	1,240
Activity B: Water Pumping for Drinking or Agriculture (Solar PV system and pump cost)					
1	1000 W		Water pump	20,00,000	20,620

Possible Activities	System Capacity (Watts)	Household size (numbe of rooms)	Appliances to be operated	Capital Cost (PKR)	Capital Cost (USD)[1]
2	1500 W			25,00,000	25,800
3	2000 W			30,00,000	31,000
Activity C: Street Lights					
1	40 W LED			150,000	1,550
2	80 W LED			200,000	2,070
Activity D: Market Lights					
1	50 W LED			170,000	1,750
2	100 W LED			230,000	2,370

Note: 1: Conversion Rate 1USD = 97 PKR
Source: Price quotations from market survey of solar vendors to provide proposed equipment in SWA.

MARKETING

A detailed dissemination strategy will need to be developed for the village communities of SWA along with the existing and potential business individuals/enterprises. These key target groups would need to be educated regarding the Solar PV technology, its mode of operation as well as the potential benefits that can be derived from it, both in fulfilling the energy requirements of the households as well as the economic benefits to be derived from adopting this technology. The capacities of the local farmer amongst the village communities would also need to be developed regarding the benefits of adopting solar powered tube wells as well as the mode of operation to maximize utilization of its benefits.

SKILLS &TECHNOLOGY

Any local technical personnel and any existing/potential business entrepreneurs interested in developing their enterprise(s) in Solar PV would need to be trained in designing, installation as well as O&M of the installed Solar PV systems.

INFRASTRUCTURE

Local businesses in SWA at the village level would need to be developed to ensure provision of the solar PV systems as well as their spare parts and accessories to the local communities and also to ensure adequate O&M of the installed systems.

BOX 5-3 SWOT ANALYSIS -SOLAR PV

STRENGTHS	WEAKNESS
• High irradiation levels in SWA will ensure technology functions at optimal level throughout the year • Proven technology and standardized design • Simple mode of operation, which does not involve any mechanically moving parts • Minimal operating costs • Short duration of approx. 3 days for installation • Solar panels guaranteed to last for 25 years • Tax exemption from Govt on Solar equipment • Basic level of awareness of Solar PV technology, even amongst the remotest of communities	• High one time upfront Capital cost and high replacement cost of battery after approx. 5 years • Lack of availability of financial resources • Complicated technology that requires considerable expertise to conduct O&M • Lack of awareness and lack of technical capacities among local communities to adequately manage the systems • Lack of availability of spare parts/components • Delicate construction of solar panel consisting of glass covering can be damaged • New market, still relatively small
OPPORTUNITIES	**THREATS**

• Obtaining electricity for communities • Development of capacity of local community members in O&M of Solar PV systems • Utilization of this technology for powering of tube wells • Use technology for setting up and powering basic health units (BHUs) with solar PV • Possibility of initiation of small-scale income generation activities driven by electricity • Possibility of promoting education by enabling students to study in the evenings • Local businesses could be developed selling Solar PV systems and accessories	• Turbulent and highly volatile security situation within SWA limiting access to certain areas/communities for installation of systems and preventing O&M of existing systems. • Rapidly increasing costs for equipment and accessories. • Failure of installed Solar PV units due to lack of proper operation and management of the systems by the operators/communities. • Multiplier effect amongst communities of installing these units does not take place due to poor O&M amongst communities.

5-3 AGENCY DEVELOPMENT PLANS POWER

5-3-1 INVESTMENT OPTION: MINI HYDROPOWER PLANTS

The investment costs associated with the development of mini/micro hydropower plants for providing electricity to remotely located communities in SWA are provided in Table 5-7(below). Also, the proposed key steps for development of MHPs in SWA are provided as Annex 5-4.

TABLE 5-7: INVESTMENT OPTION FOR MINI HYDROPOWER PLANTS[54]

PRIORITY AREAS (ADMIN. UNITS) IN SWA	IMPLEMENTING PARTNER	UNIT COST (USD)	COST EST. (MILLION $)[1]
ALL of SWA (Wana, Serwekai & Ladha)	FATA Development Authority (FDA)		
Activity A: Development of Mini hydropower projects[1]			
Option 1:5 kW MHP		9,690	1.45
Option 2:7.5 kW MHP		10,930	1.65
Option 3: 10 kW MHP		12,270	1.85
Option 4: 12 kW MHP		13,400	2.0
Option 5: 15 kW MHP		14,950	2.25
Option 6: 20 kW MHP		17,530	2.63
Option 7: 24 kW MHP		19,690	2.95
Option 8: 30 kW MHP		22,890	3.43
Activity B: Investigation of possibility for Utilization of small irrigation dams for power generation			
Tech Assess. & surveys for 13 dam sites			3.0
Activity C: Dissemination of Hydropower Technology & Capacity Development of local communities for O&M - (Yearly Basis)			
Wana			0.4
Serwekai			0.4
Ladha			0.4

Note: 1: In the first phase, the possibility of installing150'community managed' MHP units of each of the capacities provided above, divided equally amongst the three admin units of SWA is presented.

[54]PCRET Report on MHPs

RECOMMENDATION FOR IMPLEMENTATION

The major development institutions most active in the country in the renewable energy sector at present, particularly in financing of mini hydropower projects are the EU mission in Pakistan and KfW (German Development Bank). Both these institutions have recently approved significantly large grants to local development outfits such as PPAF (Pakistan Poverty Alleviation Fund), SRSP (Sarhad Rural Support Program) and AKRSP (Aga Khan Rural Support Program) for development of mini and micro hydropower projects in KPK.

Also, the German Technical Cooperation (GIZ) program on energy and hydropower, based in Islamabad, has considerable experience in supporting development and implementation of hydropower projects and their role(s) in providing technical support in this activity should be jointly discussed and considered.

Lastly, as is the case with all interventions involving rural communities, the support and involvement of capable local CSOs/NGOs will be critical, both in mobilizing the communities as well as in effectively implementing the deployment strategy and management modality for this technology, thus ensuring the sustainability of the entire program.

5-3-2 INVESTMENT OPTION: RURAL ELECTRIFICATION – BIOGAS

The investment costs associated with the installation of biogas units for the communities in SWA for generation of electricity as well as for catering to their energy needs for heating and cooking are provided in Table 5-8(below). Also, proposed key steps for development of biogas program in SWA are provided as Annexure 5-5.

TABLE 5-8: INVESTMENT OPTION FOR RURAL ELECTRIFICATION - BIOGAS[55]

PRIORITY AREAS (ADMIN. UNITS) IN SWA	IMPLEMENTING PARTNER	UNIT COST (USD)	COST EST. (MILLION $)
ALL of SWA (Wana, Serwekai & Ladha)	TESCO/FATA Secretariat		
Activity A: Large Scale 'Community Managed' Biogas Units[1]			
Option 1: 16 kWh electricity generation		7,220	3.61
Option 2: 32 kWh electricity generation		12,370	6.19
Option 3: 64 kWh electricity generation		17,530	8.77
Activity B: Small Scale Biogas Units for Households[2]			
Option 1: 4m^3 biogas digester volume		825	4.1
Option 2: 6m^3 biogas digester volume		1,030	5.2
Option 3: 8m^3 biogas digester volume		1,240	6.2
Option 4: 10m^3 biogas digester volume		1,550	7.8
Activity C: Dissemination of Biogas Technology & Capacity Development Activities for Sustainable Biogas Electrification Program - Technical Trainings of local technical personnel/businesses (Yearly Basis)			
Wana			0.3
Serwekai			0.3
Ladha			0.3

[55]Data presented here obtained from interviews conducted with Mr Prem Sagar, Biogas Expert for Winrock International.

Note: 1: In the first phase, approx. 500locationsin SWA, divided amongst the three administrative units, are proposed to be provided with 'community managed' biogas units for electrification of these communities.
2: In the first phase, Activity B presents the possibility of installing each of the four capacities of biogas units in 5000 households of SWA.

RECOMMENDATION FOR IMPLEMENTATION

It will be important to involve organizations that are working in RE in Pakistan e.g., European Union mission, JICA, World Bank and KfW (German Development Bank), etc.

Also, the technical experience and inputs from the team of RSPN (Rural Support Program Network) and its international partners, Winrock International and SNV, presently involved in implementation of the National biogas program within the country, should be utilized, both during planning and implementation of this activity. Also, for the effective and efficient deployment of this technology and sustainability of this activity, the local CSOs/NGOs with good repute and capacity to mobilize the local communities should be consulted and their possible involvement and role in this activity considered.

5-3-3 INVESTMENT OPTION: RURAL ELECTRIFICATION – SOLAR PV

The investment costs associated with the installation of solar PV units for the communities in SWA for generation of electricity are provided in Table 5-9(below).

TABLE 5-9: INVESTMENT OPTION FOR RURAL ELECTRIFICATION - SOLAR PV[56]

PRIORITY AREAS (ADMIN. UNITS) IN SWA	IMPLEMENTING PARTNER	UNIT COST (USD)	COST EST. (MILLION $)[1]
ALL of SWA (Wana, Serwekai & Ladha)	TESCO/FATA Secretariat		
ActivityA: Stand Alone Household Systems			
60 W		620	3.1
80 W		830	4.2
120 W		1,240	6.2
Activity B: Solar PV for Water Pumping from Tube wells[2]			
1000 W		20,620	6.2
1500 W		25,800	7.7
2000 W		31,000	9.3
Activity C: Solar PV Street Lights[3]			
40 W LED		1550	4.7
80 W LED		2070	6.2
Activity D: Solar PV Lights for Markets[4]			
50 W LED		1750	5.3
100 W LED		2370	7.1

Note: 1: In the first phase,5,000 households of SWA, divided amongst the three administrative units, are proposed to be provided with Stand Alone Household solar PV systems for electrification of these communities. It is assumed that 5000 systems of each of the system capacities mentioned above will be installed.
2: In the first phase, 300 tube wells will be installed/retrofitted.
3:In the first phase, 3,000 street lights will be installed/retrofitted.
4: In the first phase, 3,000 lights in the different markets in SWA will be installed.

[56]Price quotations from market survey of solar vendors to provide proposed equipment in SWA.

RECOMMENDATION FOR IMPLEMENTATION

Similar to the modality described above for the deployment of the biogas technology, major development financing institutions most active in the country in the renewable energy sector, particularly solar PV should be consulted. These may include: JICA (presently considering electrifying off-grid villages in Tharparkar district of Sindh); EU mission in Pakistan; World Bank; and KfW. Both, EU and KfW are investing heavily in supporting the development of mini and micro hydropower projects in KPK.

Also, the UNDP – Energy & Environment division as well as the German Technical Cooperation (GIZ) programs, both based in Islamabad, have considerable experience in supporting development and implementation of Solar PV projects and their role(s) in providing technical support in this activity should be jointly discussed and considered.

Furthermore, as is the case with all interventions involving rural communities, the support and involvement of capable local CSOs/NGOs will be critical, both in mobilizing the communities as well as in effectively implementing the technology. Lastly, the FATA ESP project is also to be launched in the near future and could also be used as an effective platform for promotion and development of this intervention in SWA.

6 MINERALS
6-1 MINERAL SECTOR OVERVIEW

INTRODUCTION

FATA represents a complex geological configuration hosting a number of mineral rich zones of more than 20 different minerals, such as, copper, chromite, manganese, marble, gypsum, soapstone, oil & gas and coal etc. Available geological information provides ample evidence that FATA has fairly good mineral potential as exist in similar geological environments elsewhere in the world.

SWA occupies the southern part of the tribal belt and covers an area of 6620[57] square kilometers, of which, about 70 % [58] is mountainous. Waziristan plateau overlooks the vast Bannu – D.I. Khan piedmont plain in the east, which is part of the desert fringe zone of Indus Basin. The piedmont fringe zone defines the outer periphery of Waziristan. Erosion is very fast all across this zone. Water is scarce and the whole plain has been reduced to a stony desert.

The Waziristan plateau gains height towards the interior in the west and reaches 11,526 and 10,955 feet at Pregher and Shuidar. Almost all the high peaks are composed of volcanic rocks. The eastern abutment of Waziristan plateau is a thousand feet thick deltaic mass of massive and thin-bedded limestone.

The Western half of Waziristan comprises a complex of igneous rocks which are characteristic of tectonic activity. The belt represents collisional suture zone between Indian and Afghan plates, extending in north east –south west direction and has rich mineral potential in base and precious metals and dimension stones. Moreover, comparison of geological record of the Gulf Zone with that of Indus Basin Zone implies that the sedimentary belt of the tribal area (part of the Indus Basin Zone) has potential for significant hydrocarbon/energy resources.

6-1-1 MINERAL POTENTIAL

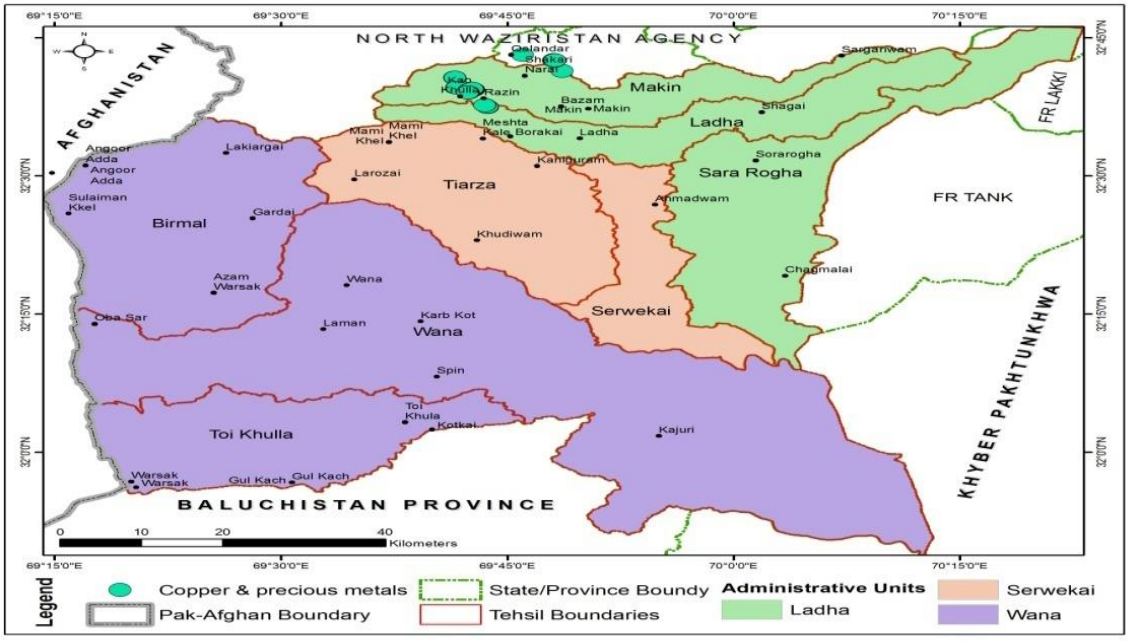
COPPER & ASSOCIATED PRECIOUS AND BASE METALS

The ophiolitic belt covering more than 2,000 square kilometers of northern part of SWA is an extension of the established metallogenic province of North Waziristan Agency, where workable deposits of copper, manganese and chromite have been identified.

Copper, base metals and other associated minerals (such as, gold, silver and zinc, etc.) have been reported from a number of places in SWA that include: Salarai; Dowegera Shkar; Qalandar; Spinkamar; Khula Soray of Spinkamar area and Massiara; Lora; Karwan Narakai; Wucha Sra Tiga, Zalula; Kao khula; and, Gariwam of Shawal area. This area is being investigated by FDA under the scheme "Base & precious metals exploration in SWA". Currently, selective mining of about 300 tons of copper is done annually.

[57] FATA Secretariat records, 2010
[58] FATA Development Statistics, Bureau of Statistics, P & D Department, Government of NWFP, 1990

FIGURE 6-1: LOCATION OF SWA COPPER DEPOSITS



Source: FDA

DIMENSION STONES

A number of isolated bodies of thick to massive granitic and surpentinite rocks that are black and blackish green in color occur in the following areas of SWA: Borakai; Bospa; Mantoi (Badar) and Santoi (Shakai) areas; and, Ladha Tehsil. These rocks with cumulative reserves of more than 2,000 million tons are capable of producing dimension blocks of quality and size that are at par with international standards. Surpeninit quarries were developed on commercial scale at Bospa, however, due to continued unrest in the area, mining activities have been suspended.

FIGURE 6-2: DIMENSION STONES DEPOSITS IN SWA

Source: FDA

CHROMITE

Chromite is used in manufacture of: refractory chrome bricks; chrome steel (for making cutting tools, projectiles and armor plates); stainless/rust proof steel; and, production of pigments, dyes and mordants. It is also used in tanning.

Two types of chromite deposits are known in the world i.e. Alpine type and Stratiform type. Chromite in SWA occurs both as Stratiform and Alpine types in the north western parts of the Serwekai Tehsil. The chromite deposits are concentrated in the ophiolit zone with dominant ultramafic rocks association. Major chromite bearing areas include Mishta, Bospa, Sholam, Mishta Chota Chashma and Bush Narai. The chromium oxide (Cr2O3) content in the chromite ore ranges from 35-45%. Up until 2007, ore was being extracted from Mishta with an average annual production of 400 tons. Since then, mining activities related to Chromite have stopped due to the conflict.

FIGURE 6-3: CHROMITE DEPOSITS IN SWA

Source: FDA

MANGANESE

Manganese is an important metallic mineral found in SWA and it is mainly used in steel industry for the production of stainless steel and special carbon steel. It is also used in a number of electrical and chemical industries. Manganese mostly occurs in the form of stringers, lenses, veins and pockets with various dimensions.

FIGURE 6-4: MANGANESE DEPOSITS IN SWA

Source: FDA

HYDROCARBON POTENTIAL

The eastern part of SWA comprises of thick sedimentary rock sequence. Geological studies for this area point towards a presence of a petroleum system i.e. source, seal and reservoir rocks. Recent discoveries of hydrocarbon in adjoining areas of Kohat and Suleman Basin and parts of Baluchistan also support the idea of existence oil & gas in the area. Given these encouraging geological indicators Oil & Gas Development Company Ltd has acquired exploration license for Wali Block (parts of SWA, FR-Tank and Bannu) and Saif Energy Ltd. has applied for an exploration license for Wali West (North Waziristan and SWA) and Baska North (SWA and parts of FR D.I. Khan).

The Federal Government has initiated work on ways they can provide security to oil exploration companies that want to work in the field. It is envisaged that the first phase of geophysical exploration will be completed in about one year.

6-1-2 INSTITUTIONAL FRAMEWORK

According to the National Mineral Policy (NMP) 1995, the country is divided into seven federating units (i.e. Khyber Pakhtunkwa, Punjab, Sind, Baluchistan, AJK, NA and FATA) and it is mandatory for all the units to establish a separate Department of Mineral Development with a Licensing Division and Exploration Promotion Division. In FATA, the functions of Exploration Promotion and Licensing are separately carried out by FATA Development Authority and FATA Secretariat.

FATA SECRETARIAT (FS)

FS performs the regulatory functions and facilitates public and private sector entities in security clearance and conflict resolution through the concerned political administration.

FATA DEVELOPMENT AUTHORITY (FDA)

FDA was established in 2006 as a corporate body. Its mandate is to develop and execute programs/projects related to the exploration and exploitation of mineral resources in FATA.

NATIONAL CENTER OF EXCELLENCE IN GEOLOGY

National Center of Excellence in Geology is a research institute of University of Peshawar in earth sciences it has conducted significant research in the tribal belt.

PAKISTAN MINERAL DEVELOPMENT CORPORATION (PMDC)

PMDC is a subsidiary of Ministry of Production and is involved in mineral sector development and promotional activities. It has experience in energy, industrial and metallic minerals exploration.

MINERAL TESTING LABORATORY (MTL)

MTL is working under the Directorate General of Mines & minerals, Khyber Pakhtunkhwa, which has reliable mineral testing facilities.

FUEL RESEARCH CENTRE (FRC)

FRC is a specialized institution for research in coal and other energy minerals under Pakistan Council of Scientific & Industrial Research Labs. FRC is currently working with FDA for the establishment of a coal briquetting plant based on FATA coal.

WORKS & SERVICES DEPARTMENT FATA

This Department is responsible for construction of roads and buildings in FATA and is a Line Department of FS. It served as the key executing agency for construction of roads in mineral bearing areas of FATA.

SMALL AND MEDIUM ENTREPRENEUR DEVELOPMENT AUTHORITY (SMEDA)

SMEDA is a corporate body working under the Ministry of Industries and is geared towards facilitating private sector investors in preparation of feasibilities and arranging funds from financial institutions. SMEDA has been providing assistance to FDA and FS on various projects in the mining sector.

GEOLOGICAL SURVEY OF PAKISTAN (GSP)

GSP is an organization of the Ministry of Petroleum and Natural Resources and is responsible for preparation of standard geological maps of the country.

PAKISTAN STONE DEVELOPMENT COMPANY (PASDEC)

PASDEC is a federal government organization with the exclusive mandate to develop marble & granite sector in the country. It recently started producing squared marble blocks by introducing block-cutting machinery in Mohmand Agency.

FATA MINE OWNERS ASSOCIATION (FMOA)

FMOA is a registered entity that is responsible for safeguarding the interests of mineral sector investors in FATA through FATA Secretariat and political administration of the concerned agency.

6-1-3 REGULATORY FRAMEWORK

Under the NMP, all seven federating units are required to frame their Mining Concession Rules. All the other constituent units, except for FATA, have their own approved Mining Concession Rules. However, for the last 15 years FATA has adopted the Concession Rules of Khyber Pakhtunkhwa.

The Mining Concession Rules provide for the following types of mineral titles:

- Reconnaissance License, granted over an area of 100 to 10,000 sq. km.
- Exploration License, granted over an area up to 1000 sq. km. for 6 years.
- Mineral Deposit Retention License, granted for a particular area for 4 years.
- Mining Lease, granted for a maximum of 250 square kilometer area for 30 years or estimated life of the deposit.

Typically, the Mineral Department decides on the quantum of area allotted under any concession. This is not the case for FATA as the decision to allot a certain area rests with the tribe who owns the land. The mineral sector activities are mostly carried out informally.

6-1-4 GOP DEVELOPMENT STRATEGY

FDA is responsible for undertaking most of the mineral sector development work. The organization has initiated programs for mineral exploration, infrastructure development in mineral bearing areas and establishment Mineral Trading Yard at Bannu for minerals extracted from North & SWA Agencies.

6-1-5 DONOR ASSISTANCE PROGRAM'S AND STRATEGIES

The following donor agencies have funded interventions in FATA's mineral sector.

- USAID under its FATA Development Program- Livelihood Development (FDP-LD) carried out the following projects;
    - Marble Value-Chain studies through J.E. Austin & Associates
    - Establishment of Marble Machinery Pool
- World Bank helped in formulation of National Mineral Policy 1995.
- GSP in collaboration with United States Geological Survey (USGS) carried out geological mapping of parts of SWA Agency on scale 1:250,000.
- Aus AID helped in preparing a comprehensive report on implementation of National Mineral Policy 1995 including recommendation of institutional structures for the federating units.

6-2 MINERALS OPPORTUNITY ASSESSMENT

In the past, mineral exploration work has been carried out in SWA on an intermittent basis. Sustained development efforts for developing the mineral sector of the agency were hampered by the non-cooperative attitude of the local communities. Therefore, SWA has largely remained unexplored and provided below are some important facts about its mineral sector:

- In the absence of proper geological information, unscientific sporadic extraction of different minerals (like copper, chromite and manganese) has been conducted informally by the locals. This has resulted in premature closure for a number of small mines and the destruction of any surface evidence of these minerals which would have played an important role in any future exploratory efforts.

- Land in SWA is the collective property of the tribes that inhabit them. For mining activities, the tribe makes key decisions relating to mining activities, such as, length of time they will allow extraction for, amount of commission they will charge buyers, etc. Typically, the commission is calculated on a truck load basis, however, absence of weighing bridges results in buyers misusing this formula as they overload their trucks.

- The prevailing insurgency in the agency has mostly halted any mining activity due to non-availability of blasting material and fuel.

SUB-SECTOR SELECTION

As discussed earlier, geological investigations reveal presence of four different minerals in various parts of SWA. Opportunities discussed below relate to three main minerals: dimension stones; chromite; and, manganese.

6-2-1 SECTORWIDE INTERVENTION: GEOLOGICAL BASE MAP

Preparation of a standard Geological Base Map on scale 1:50,000 is a prerequisite for exploration and evaluation of mineral potential of an area. It helps in delineating various rock formations exposed in the area with their evolution trend/attitude, mineralogy, structural/genetic relation, deformation/alteration and identification/location of prospective zones. Such maps provide bases for identification of mineral bearing zones and onward detailed surface and subsurface studies.

Preliminary geological maps of parts of SWA were prepared in the past by GSP, FATA DC and different researchers. These maps lack important information which provide basis for deriving genetic models for different minerals in the area. In the absence of a geological base map, real mineral potential of these agencies cannot be established on scientific lines. Therefore, it is important to prepare a Geological Base Map of the agency as per United States Geological Survey (USGS) standards.

RESOURCE REQUREMENT

FINANCIAL

Estimates of financial resources required for developing the Geological Base Maps are provided in Table 6-1 (below).

TABLE 6-1: RESOURCE REQUIREMENT OF GEOLOGICAL BASE MAP SUBSECTOR

Agency	Area	Investment Option	Cost US$ (in million)	Cost PKR (in million)
SWA	Entire Agency	Preparation Geological Base Map of SWA on scale 1:50,000	5.460	529.600

Source: Market Survey conducted by the consultant

SKILLS

The maps will be prepared in collaboration with related organizations like National Centre of Excellence in Geology, Department of Geology University of Peshawar and other private sector institutions.

SWOT ANALYSIS

• STRENGTHS	• WEAKNESSES
▪ Presence of a number of favorable geological features in SWA Agency. ▪ Frequency of occurrence of different minerals in various parts of the Agency. ▪ Presence of petroleum system in the Agency.	▪ Lack of due intervention of GSP in the tribal area. ▪ Non-involvement of private sector in generation and marketing of geotechnical data. ▪ Uncooperative attitude of locals and political administrations.
• OPPORTUNITIES	**• THREATS**
▪ Availability of qualified experts in the related field ▪ Easy availability of experienced experts in other supporting disciplines i.e. GIS, geochemistry etc ▪ Availably of authentic geotechnical data for mineral exploration & development by public/private sector investors	▪ Insecure working conditions

6-2-2 SUB SECTOR: DIMENSION STONES

The marble sector of FATA is presently providing over 5,000 job opportunities in different mining activities. The sector has the capacity to easily absorb another 20,000 people provided it is developed on modern scientific lines[2]. However, despite the presence of extensive world class granite deposits, the sector has not been able to play its due role in generation of economic activities for FATA.

TABLE 6-2: PAKISTAN MARBLE SECTOR STATISTICS

Year	Marble & Granite production	Export (In million tons)	Export value in US $ (million)	Growth rate
2004-05	1.280	0.043	12.262	19%
2005-06	1.835	0.036	11.929	-16%
2006-07	1.980	0.046	15.970	28%
2007-08	1.537	0.076	25.496	63%
2008-09	0.946	0.098	34.327	74%
2009-10	1.385	0.122	36.162	95%
2010-11	1.527	0.381	39.584	91%

BORAKAI GRANITE DEPOSITS

Three main granite bodies lie in a linear east-west direction in close proximity and east of Ladha (Figure 6-5). The granitic bodies are exposed over a thickness of 350 meters each. These are massive in nature and bluish black in color. These deposits are fine grained in texture and soft as compared to typical granites. Each deposit carries about 250 million tons. Previously, FATA DA and PASDEC intended to establish model quarries on these deposits but due to law & order situation in the area the initiative could not materialize. Presently no quarrying is done in the area.

Water and power are available in the area. However, access road will be required to reach the quarrying face for installation of block cutting machinery which will be able to produce blocks of any size.

RESOURCE REQUIREMENT

FINANCIAL

Estimates of financial resources required for developing the dimension stones sub-sector are provided in Table 6-2 below.

- **TABLE 6-2: RESOURCE REQUIREMENT FOR DIMENSION STONES SUB SECTOR**

AGENCY	AREA	INVESTMENT OPTION	COST$ (IN MILLION)	COST PKR (IN MILLION)
SWA	Borakai	Installation of Block Cutting Machinery at Borakai granite deposits (2 No.)	2.886	280.000
Total requirement:			**2.886**	**280.000**

Conversion is made on the prevailing market rate of 1 US$ = 97 PKR

SKILLS & TECHNOLOGY

Technical assistance for preparation of Quarry Cultivation Plan, Bench Making, installation and operation of cutting machinery is available with Geology Department, University of Peshawar, University of Engineering & Technology (UET) KPK, PCSIR Labs and PASDEC. There would not be any issues in sourcing operational and maintenance workforce as a number of practical courses in relevant fields are conducted at UET, PCSIR and PASDEC.

SWOT ANALYSIS

STRENGTHS	WEAKNESSES
▪ Large & massive deposits of superior quality granite ▪ Variety of colors ranging from grey to bluish black ▪ Readily available demand in national & international markets ▪ Cheap labor ▪ Low royalty rates ▪ Prioritization of marble& granite bearing areas for development of infrastructure ▪ Up-gradation of marble mines	▪ Primitive & indiscriminate blasting ▪ Poor infrastructure ▪ Lack of knowledge of latest quarrying and processing techniques & equipment ▪ Remoteness from major stone markets ▪ Inappropriate regulatory framework ▪ Frequent policy changes ▪ Low private sector investment ▪ Low education level ▪ Low marketing efforts ▪ Low quarry productivity

OPPORTUNITIES	THREATS
▪ Large world market ▪ Growing construction industry ▪ New products and usage ▪ Greater value addition ▪ Application of block cutting technology ▪ Private sector investment in improved mining technology	▪ Increasing political instability ▪ Environmental degradation ▪ High resource degradation ▪ Increasing power & fuel costs ▪ Inaccessibility to blasting material

6-2-3 SUB-SECTOR: CHROMITE

In FATA, most of the chromite deposits occur in Bajaur, Mohmand North Waziristan and SWA Agencies in mélange zones. The chromium oxide (Cr2O3) content ranges from 35–50%. Average annual production of chromite is about 0.125 million tons.

Chromite production from FATA registered an increase during the last six years as a number of prospective areas were identified and opened for mining due to provision of access roads in the areas. This can be seen in Table 5-5 (below).

TABLE 6-4: CHROMITE PRODUCTION OF FATA

Year	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Production (in million tons)	0.048	0.054	0.056	0.089	0.126	0.139

Source: Mineral production data, FATA Secretariat

The entire chromite ore produced from FATA, including Bajaur, Mohmand, North &SWA agencies, is transported to the settled areas for onward export in lumps form. An average of 400 tons chromite ore was mined annually from SWA till 2007. Due to the ban on blasting material and that most of the chromite deposits are in difficult to reach parts of SWA, no mining activity has been reported since 2007.

About 60% of the ore has 40 to 50% chromium oxide (Cr2O3) content which does not require up-gradation. However, the rest of the ore with 30 to 40% chromium oxide (Cr2O3) content require beneficiation. The low grade chromite can be easily up-graded through gravity process which involves establishment of an up-gradation plant.

RESOURCE REQUREMENT

FINANCIAL

Estimate of financial resources required for developing the chromite subsector is provided in Table 6-5 (below).

TABLE 6-5: RESOURCE REQUIREMENT OF CHROMITE SUB-SECTOR

Agency/FR	Area	Investment Option	Cost US$ (in million)	Cost PKR (in million)
FR Bannu	Mineral Trading Yard	Establishment of Gravity Beneficiation plant for chromite	0.722	70.000

Conversion is made on the prevailing market rate of 1 US$ = 97 PKR

SKILLS & TECHNOLOGY

The beneficiation plant could be established with the technical assistance of PCSIR Labs (Peshawar) and Tribal Chamber of Commerce & Industries who have the expertise in establishment of such units.

SWOT ANALYSIS

STRENGTHS	WEAKNESSES
▪ Extensive presence of chromite hosting rocks. ▪ Surface exposure of a number of chromite bodies ▪ Medium to high grade chromite ores ▪ Cheaper labor ▪ Low royalty rates ▪ Prioritization of mineral bearing areas for development of infrastructure. ▪ Establishment of Mineral Trading Yard	▪ Lack of proper documentation of chromite deposits. ▪ Poor infrastructure ▪ Lack of knowledge of latest quarrying and processing techniques & equipment ▪ Lack of proper marketing knowledge ▪ Inappropriate regulatory framework ▪ Low private sector investment ▪ Low quarry productivity
OPPORTUNITIES	**THREATS**
▪ Large world market ▪ Growing ferrochrome industry ▪ High market value ▪ Value addition ▪ Bright future for setting up ferrochrome and chrome chemical industries	▪ Increasing political instability ▪ High fuel costs ▪ Inaccessibility to blasting material ▪ Unscientific mining methods

6-2-4 SUB SECTOR: MANGANESE

Manganese mostly occurs in the form of stringers, lenses, veins and pockets with various dimensions in the area. Manganese deposits are located along the northern and central parts of the agency. The Manganese Dioxide (MnO2) content is very high and can be used for manufacturing of Ferro-manganese alloy[59]. Prior to 2007, limited mining (around average annual production of 200 tons) was carried out in SWA. Since then, mining activities have been suspended due to the unrest.

TABLE 6-6: MANGANESE PRODUCTION FROM FATA

Year	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Production	450	1,253	1,197	1,223	2,156	1,753

Source: Economic Survey of Pakistan, 2008-09

The prevailing market prices for manganese ores with 30-40% and 40-50% MnO^2 content ranges from Rs.115,00 to 220,00 and Rs.40,000 to 45,000, respectively[60].

In FATA, manganese deposits are mainly associated with ophiolit belts extending through Bajaur, Mohmand, North and SWA Agencies. Manganese mineralization has been identified at Rogh Narai,Spinkay, Sur Zhao, Karwan Narakai and Sur Narai Top in Serwekai and Ladah Tehsils (Map 6-4). The Manganese Dioxide (MnO2) content of these deposits is 70-80%

Currently, the entire production of Manganese from Pakistan is exported in raw form mainly to China. This takes on added significance when considered with the fact that steel mills operating in Pakistan rely mostly on imported manganese ore. All the steel foundries in the country use imported ferromanganese alloys. Pakistan imported ferromanganese worth US$ 12.65 million and US$ 9.00 million during 2008-09 and 2009-10 respectively[61].

In order to carry out value addition of the manganese ore from SWA, establishment of a medium scale ferromanganese manufacturing plant is required.

[59]Haqqani. F. Geology and mineral potential of SWA Agency, 2008.
[60] Based on local market survey.
[61] Federal Bureau of Statistics, Imports of Pakistan, 2009-10.

RESOURCE REQUREMENT

FINANCIAL

Estimates of financial resources required for developing the Manganese sub sector are provided in Table 6-7 (below).

TABLE 6-7: SHOWS RESOURCE REQUIREMENT OF MANGANESE SUB-SECTOR

Agency	Area	Investment Option	Cost US$ (in million)	Cost PKR (in million)
FR Bannu	Mineral Trading Yard	Establishment of ferromanganese manufacturing plant based on raw material from FATA	1.340	130.000

Conversion is made on the prevailing market rate of 1 US$ = 97 PKR

SKILLS & TECHNOLOGY

The plant will be established with the technical assistance of University of Engineering & Technology Peshawar and PCSIR Labs Peshawar as they have the expertise in development of such units.

SWOT ANALYSIS

STRENGTHS	WEAKNESSES
▪ Presence of a number of manganese prospects with high Manganese content. ▪ Existence of favorable geological environment for identification of more manganese prospects ▪ Successful manufacturing of ferromanganese alloy from Bajaur manganese ore of pilot plant scale ▪ Easy availability of other ingredients used in manufacture of ferromanganese alloy i.e. coal & limestone	▪ Lack of proper documentation of manganese deposits ▪ Poor infrastructure ▪ Lack of knowledge of latest processing techniques & equipment ▪ Lack of proper marketing knowledge ▪ Inappropriate regulatory framework
OPPORTUNITIES	**THREATS**
▪ Large local market ▪ Growing steel industry ▪ High market value ▪ Value addition ▪ Saving of more than US$ 10 million foreign exchange ▪ Generation of 300 job opportunities in mining and processing activities	▪ Increasing political instability ▪ High electricity charges ▪ Irregular power supply ▪ Inaccessibility to blasting material ▪ Unscientific mining methods

6-3 AGENCY DEVELOPMENT PLANS MINERALS

6-3-1 INVESTMENT OPTIONS FOR MINERALS

Mineral sector investment options for SWA are provided in Table 5.9 (below).

TABLE 6-8: INVESTMENT OPTIONS FOR MINERALS

Location	Sub-sector	Implementing partner	Investment Option	Time Frame	Cost Est. (US$, million)
Borakai-1, Ladha	Granite	FDA, FS and PASDEC	Installation of Block Cutting Machinery in Borakai-1 Granite deposit	6 months	1.443
Borakai-2, Ladha	Granite	FDA, FS and PASDEC	Installation of Block Cutting Machinery in Borakai-2 Granite deposit	6 months	1.443
Mineral Trading Yard (Bannu)	Chromite	FDA, FS, PCSIR Labs and Tribal Chamber of Commerce & Industries	Establishment of Gravity Beneficiation plant for chromite	9 months	0.722
Mineral Trading Yard (Bannu)	Manganese	FDA, FS, PCSIR Labs, Tribal Chamber of Commerce & Industries and UET	Establishment of ferromanganese manufacturing plant based on raw material from FATA	9 months	1.340
Mineral Trading Yard (Bannu)	Geological Base Map	FDA, NCEG, Department of Geology and Private Sector Institutions	Preparation Geological Base Map of SWA on scale 1:50,000	30 months	5.460

RECOMMENDATIONS FOR IMPLEMENTATION

The mandate for exploration, documentation and development of mineral resources of SWA is shared amongst FDA, GSP and PMDC. These organizations have had limited success in exploiting the mineral potential of the agency due to: lack of qualified human resources; financial constraints; and, security issues. Similar issues are also faced by other organizations that provide supporting services for development of infrastructure and geochemical studies in mineral bearing areas, such, as, the Works & Services Department, Mineral Testing Laboratories, etc. It is therefore important to address the technical and operational deficiencies faced by these organizations in accessing and working in SWA.

In the medium term, the Pakistan Army can play a key role in the development of the mineral sector as a majority of SWA's mineral deposits are located in areas that are controlled by the army. The army is already working with FDA on several mineral sector development projects in North Waziristan (copper) and Bajaur and Mohmand (managanese and precious stones).

While implementing the proposed interventions, it is important to involve private sector organizations, such as, TACCI, FMOA, etc. In doing so will build ownership and support for these projects with FATA stakeholders.

Provided below are more specific recommendation for implementations for the interventions proposed here:

- Preparation of a standard **geological base map** on scale 1: 50,000 is an essential instrument for assessment of real mineral potential of an area. In order to carry out the geological mapping in a scientific and professional manner, the assignment can be outsourced to National Centre of Excellence in Geology and Department of Geology, University of Peshawar. These institutions have relevant expertise and capacity to conduct such interventions. In addition, the area possesses extremely complex geological configuration with a variety of sedimentary, igneous and metamorphic rocks, which can provide a number of post graduate level research opportunities. Presently, National Centre of Excellence in Geology is successfully executing a similar project "Source rock mapping and investigation for hydrocarbon potential in FATA".

- A number of local organizations and institutions have developed expertise in installation and operation of in situ **block cutting machinery**. PASDEC, UET and PCSIR are among such organizations. PASDEC has established nine such quarries in Baluchistan, FATA, KP and Sindh. UET is providing technical assistance for such ventures. PCSIR is conducting diploma level courses for quarry masters and other related machine operators.

- Presently, a number of locally fabricated **chromite beneficiation plants** have been installed in Peshawar, Hatar, Lahore and Karachi for up-gradation of chromite from FATA, KP and Afghanistan. Similarly, ferromanganese manufacturing plants have been established in Lahore and Karachi, which have been locally fabricated by Heavy Mechanical Complex Taxila. As such, expertise for both stages of manufacturing and operation are available.

7 BIBLIOGRAPHY

1. ADB-FRDP 2010a Water assessment study and management plan for Bajaur, Khyber and Mohmand Agencies Volume I, Main Report FATA Rural Development Project (FRDP), FATA Secretariat, Government of Pakistan.
2. ADB-FRDP 2010b Water assessment study and management plan for Bajaur, Khyber and Mohmand Agencies. Volume II, Annexures FATA Rural Development Project (FRDP), FATA Secretariat, Government of Pakistan.
3. Ahmad, S and F Steenburgen. 2011 The Potential of Developing Spate Irrigation System in Pakistan. Practical Notes for Spate Irrigation, MetaMeta, Netherlands.
4. Academy for Educational Development (AED) Upper FATA Livelihood Development Program funded by USAID "1st Annual Report (May 1st 2008 – April 30th 2009)
5. Asian Development Bank. Technical Assistance to the Islamic Republic of Pakistan for preparing the Federally Administered Tribal Areas Rural Development Project Nov 2002.
6. Azhar Mahboob, Progress review of the scheme "Source Rock Mapping and investigation for hydrocarbon potential in FATA" January 2013 National centre of Excellence in Geology, University of Peshawar, KP, Pakistan
7. CHF and Sardar & Sardar 2009 Compilation, Evaluation and Gap Identification of Existing Water Sector Studies in FATA Final Report CHF International and Sardar and Sardar Development and Management Consultants.
8. Civil Secretariat FATA Peshawar "FATA Sustainable Development Plan 2007–2015"
9. Civil Secretariat FATA Peshawar "FATA Sustainable Development Plan 2007–2015"
10. FATA-DA 2012 Annual Development Budget 2012-13 FATA Development Authority, FATA, Peshawar.
11. FATA-S 2007 Sustainable Development Plan 2006-15. Department of Planning and Development, Civil Secretariat FATA, Peshawar.
12. FATA-S 2009a Development Brief of South Waziristan 2008-09. Bureau of Statistics (FATA Cell), Planning and Development Departments. FATA Secretariat, Peshawar.
13. FATA-S 2009b Cost of conflict in FATA Department of Planning and Development, FATA Civil Secretariat Peshawar.
14. FATA-S 2010 FATA Annual Development Budget 2010-11 FATA Secretariat. FATA, Peshawar.
15. FATA Agriculture Statistics 2009-10 Crop Reporting Cell in Directorate of Agriculture Extension FATA Peshawar, Government of Khyber Pakhtunkhwa.
16. FATA Assessment Study by FIRMS Project funded by USAID
17. FATA-DA 2012 Annual Development Budget 2012-13 FATA Development Authority, FATA, Peshawar.
18. FATA-S 2007 Sustainable Development Plan 2006-15. Department of Planning and Development, Civil Secretariat FATA, Peshawar
19. FATA-S 2009a Development Brief of South Waziristan 2008-09. Bureau of Statistics (FATA Cell), Planning and Development Departments. FATA Secretariat, Peshawar.
20. FATA-S 2010 FATA Annual Development Budget 2010-11. FATA Secretariat. FATA, Peshawar.
21. FATA Secretariat "Tribal Areas Rural-to-Urban Centers Conversion Initiative (T.A.R.U.C.C.I)" 2010
22. FATA Digest of Mega Projects.
23. FATA Secretariat, Annual mineral production data 2006, FATA Secretariat, Warsak Road, Peshawar KP – Pakistan.
24. FATA Bureau of Statistics 2010. Brief on South Waziristan Agency, Bureau of Statistics (FATA Cell). Planning and Development Department, FATA Secretariat, Warsak Road, Peshawar, Khyber Pakhtunkhwa – Pakistan.
25. Fazli Haqqani, A report on geology and mineral potential of South Waziristan Agency, 2008, Pakistan.
26. Federal Project Management Unit Islamabad "Strengthening of Livestock Services PAKISTAN Annual Report "for Project year 1 16/09/2003 – 30/06/2004.
27. Fida Muhammad "Integrated Marketing Services as an approach to Sustainable Horticultural Development" in NWFP, Pakistan.
28. Fida Muhammad Agribusiness Development and Diversification Project ANZDEC Pvt Ltd, New Zealand "Project Baseline Survey March 2009".
29. Government of Pakistan Finance Division Economic Survey of Pakistan 2011.
30. Government of Pakistan FATA Secretariat "Horticulture Policy FATA May 2009.
31. Government of NWFP "Comprehensive Development Strategy 2009 – 2015" Draft Final Report April 2009.
32. Government of Pakistan Finance Division "Poverty Reduction Strategy Paper-II-Increasing Productivity and Value Addition in Agriculture" June 2010.

33. Government of NWFP, P & D Department, Government of NWFP, FATA Development Statistics,1990.
34. Government of Pakistan, Survey of Pakistan Topo-Geological Maps North & South Waziristan Agencies.
35. Government of Pakistan, Planning Commission, Bureau of Statistics, Imports of Pakistan, 2009-10.
36. Grace Association. 2009. The Voices of Grassroot. Grace Association of Pakistan.
37. Mazhar Arif thematic paper "Agriculture and Food Security in Pakistan"
38. Pakistan Dairy development Company "The white revolution- White paper on Pakistan's Dairy Sector June 2006
39. Pakistan: Power Distribution Enhancement Investment Program (Multitranche Financing Facility), ADB Annex I pg 26
40. PCRET Report on MHPs.
41. Planning & Development Department, FATA Secretariat Peshawar "Digest of Mega Projects" September 2008.
42. Project Director FATA Rural development Project "Baseline Survey Report draft" Oct 2008
43. Pildat discussion paper on Pak Afghan Trade.
44. Planning & Development Department, FATA Secretariat Peshawar "Cost of Conflict in FATA" April 2009.
45. Planning & Development Department, FATA Secretariat Peshawar "Digest of Mega Projects" September 2008.
46. Presentation by USAID on North & South Waziristan Agencies, May 2011.
47. Presentation by USAID on North & South Waziristan Agencies, May 2011.
48. RSPN report on Biogas Installations in Pakistan, 2010.
49. R.H. Sillitoe , Metallogenic evolution of collisional mountain belt in Pakistan, 1979.
50. Safdar Khan Kakar, The development of potential of Waziristan , 1975.
51. TESCO Briefing to Functional Committee on Problems of Less Developed Areas.
52. Technical Support and Planning Unit USAID "Socio-Economic Profile of Bajaur Agency" Sep 1992.
53. Technical Support and Planning Unit USAID "Socio-Economic Profile of Mohmand Agency" May 1993.
54. USAID 2007 Pakistan Agenda for Action. Federally Administered Tribal Areas (FATA), Assessment Report of 2007. USAID.
55. USAID. 2012a FATA Assessment Study of South Waziristan. Final Report.
56. USAID 2012b Social Sector Baseline Survey. USAID and FATA Secretariat, Peshawar.
57. Upper FATA Livelihood development Program funded by USAID "Plastic Tunnels Improving FATA Agriculture Practices The emerging impact" Feb 2010.
58. Government of Pakistan Finance Division Economic Survey of Pakistan 2010.
59. Government of Khyber Pakhtunkhwa "FATA Agriculture Statistic" 2008-9.
60. Ministry of Commerce, Islamabad "Afghanistan Pakistan Transit Trade Agreement" 2010.
61. Monitoring and Evaluation Services South Waziristan "Social Sector based profile of SWA".
62. Mian Sayed Badshah, Development potential of Waziristan copper, 1985.
63. USAID Pakistan Trade Project (PTP) "Concept Paper" June 18, 2010.
64. USAID Presentation "Support in South & North Waziristan" May 2011.
65. USAID. 2007. Pakistan Agenda for Action. Federally Administered Tribal Areas (FATA), Assessment Report of 2007. USAID.
66. USAID 2012a FATA Assessment Study of South Waziristan. Final Report.
67. USAID 2012b Social Sector Baseline Survey. USAID and FATA Secretariat, Peshawar.
68. WAPDA 2012 GomalZam Dam Project. Office of the Project Director, GomalZam Dam, D. I. Khan.
69. World Bank Report on Electricity Distribution and Transmission Improvement Project, pg. 1 May 22, 2008.
70. WAPDA Statistics Report July 2010. Pakistan.
71. WAPDA. 1998 Hydrology and Groundwater Report. Water and Power Development Authority, WAPDA House, Lahore.
72. WAPDA 2012 Gomal Zam Dam Project. Office of the Project Director, Gomal Zam Dam, D. I. Khan.
73. WFP 2009 Rapid Need Assessment. World Food Programme, Islamabad.
74. WB, ADB and GOP 2009. Preliminary Damage and Need Assessment. Immediate Restoration and Medium-Term reconstruction in Crises Affected Areas. Asian Development Bank, World Bank and Government of Pakistan, Islamabad.
75. WFP 2010 Food Security and Market Assessment in Crises Areas of KPK and FATA. World Food Programme and Supported by PaRRSA, UNFEM, FAO, WHO and FATA Secretariat.

USAID
FROM THE AMERICAN PEOPLE

FATA INSTITUTIONAL STRENGTHENING PROJECT

SOUTH WAZIRISTAN AGENCY DEVELOPMENT PLAN

– ANNEXURES

Annex 3-1:

Farm Services Centers (FSCs) and list of machinery

In the province a large number (91%) of farmers are small landholders who are poor, powerless and often pathetic. Their accessibility to institutional credit, technical information and improved production inputs is limited resulting in low return per unit area that increased their miseries (Government of NWFP, 2004). This situation grasps the attention of the government, World Bank, Asian Development Bank and SDC Inter-Cooperation who emphasized to target these problems. These all efforts are based on 1980's Agricultural policy which emphasized growers to make their associations at local and provincial levels which may act as a platform for the solution of their farm problems and formulation of policies for the farm sector. Introduction of farm services centers in the province has aroused great interest in the farming community who are voluntarily entering into membership both paying membership fee as well as contribution share for availing inputs facilities.

The FSCs concentrate all green sector and other related organizations at one platform to provide services to farming community and planning local development strategies with the full participation of farmers (Government of NWFP, 2004). The recent Government has taken different steps concerning FSCs. According to short term measures taken under NWFP Agricultural Policy-2005, it has been decided to establish model farm services Centers. The centers will provide an interface among agriculture related departments, NGO,s and farming communities. Service delivery of the farmers will be ensured through one window facility. Moreover, endowment fund will be created, which will be used for the purpose of credit for farmers and efficient running of the centers. Similarly quality and cost effective seed and fertilizer will be provide to farming community at their doorsteps through Farm Services Centers and sub-centers. FSCs are registered with Government under cooperative Act, 1925. Following machinery is required for FSCs to increase their efficiency:

List of machinery

S. #	Name of machinery	Estimated cost in Rs
1	Bulldozers (80 to 100 HP)	Rs. 16,000,000
2	Tractor Fiat 640 HP	Rs. 900,000
3	Tractor Fiat 480 HP	Rs. 700,000
4	Cultivator 11 tines	Rs. 80,000
5	MB Plough	Rs. 60,000
6	Seed drill	Rs 200,000
7	F/Plant digger	Rs. 350,000
8	Hand sprayer	Rs. 15,000
9	Generator (10 to 15 KV)	Rs. 550,000
10	Wheat Thresher	Rs. 600,000
11	Maize Sheller	Rs. 150,000
12	Seed cleaner/grader	Rs. 650,000
13	Front blade	Rs. 70,000
14	Rear blade	Rs. 80,000
15	Ridger	Rs. 77,000
16	Rotavator	Rs. 160,000
17	Potato planter	Rs. 250,000
18	Potato digger	Rs. 200,000
19	Zero tillage	Rs. 100,000
20	Rotary hoe	Rs. 50,000
21	IT equipment (computer sets)	Rs. 70,000

Annex 3-2

DAMAGE AND NEED ASSESSMENT OF LIVESTOCK & DAIRY DEVELOPMENT DEPARTMENT FOR SWA TANK[62]

S. No.	Location	Facility	Damage in %		Estimated Cost of repair in PKR Millions		
			Building	Material	Building	Material	Total
Tehsil Ladha							
1	Ladha	CVH	80%	100%	2.640	0.300	2.940
2	Kanigurram	CVD	75%	100%	2.475	0.300	2.625
3	Murdaralged	CVD	95%	100%	3.135	0.150	3.285
4	MasapMela	CVD	-	100%	-	0.300	0.300
5	KotJalandar	CVD	-	100%	-	0.150	0.150
6	KhoneKhel	CVC	-	100%	-	0.150	0.150
7	Kot Akbar Jan	CVC	-	100%	-	0.150	0.150
8	KotSaifurRehman	CVC	-	100%	-	0.150	0.150
9	Kot Amir Muhammad	CVC	-	100%	-	0.150	0.150
10	KotIrfanBurki	CVC	-	100%	-	0.150	0.150
11	KotAzizullahKhadarKhel	A.I	-	100%	-	0.250	0.250
12	KotMaulanaFaridullahShabiKhel	A.I	-	100%	-	0.250	0.250

[62] Source: : Office of the Agency Livestock Officer, Livestock and dairy development department SWA based at Tank

S. No.	Location	Facility	Damage in %		Estimated Cost of repair in PKR Millions		
			Building	Material	Building	Material	Total
Tehsil Makin							
13	Makin	CVD/AI	80%	100%	2.640	0.300	2.940
14	KotShakhad	CVD	85%	100%	2.805	0.150	2.955
15	Kot Darya Khan	CVC	-	100%	-	0.150	0.150
16	KotPirGhulam	CVC/AI	-	100%	-	0.400	0.400
17	KotGul Muhammad	CVC	-	100%	-	0.150	0.150
18	KotRaza Khan	CVC	-	100%	-	0.150	0.150
19	KotShamsuzuman	AI	-	100%	-	0.250	0.250
Tehsil Sararogha							
20	Sararogha	CVH/AI	100%	100%	3.300	0.300	3.600
21	Kot Muhammad Alam	CVH/AI	100%	100%	2.610	0.300	2.940
22	Kotkai	CVD	-	100%	-	0.150	0.150
23	chapari	CVD	-	100%	-	0.150	0.150
24	Kazakach	CVD	-	100%	-	0.150	0.150
25	Sulamanshai	CVD	-	100%	-	0.150	0.150
26	MirmonGul	CVC	-	100%	-	0.150	0.150
27	KotAzizullahWalma	CVC/AI	-	100%	-	0.400	0.400
28	KotMaulanaSaifudinImarRaghzai	AI	-	100%	-	0.250	0.250

S. No.	Location	Facility	Damage in %		Estimated Cost of repair in PKR Millions		
			Building	Material	Building	Material	Total
29	KotRamtalBatakai	AI	-	100%	-	0.250	0.250
Tehsil Sarwakai							
30	Old Sarwakai	CVD	80%	100%	2.640	0.150	2.790
	Old Sarwakai	AI			-	0.150	0.150
31	Siplatoi	CVD	80%	100%	2.640	0.150	2.790
	Siplatoi	AI			-	0.150	0.150
32	Sinatiza	CVD	75%	100%	2.475	0.150	2.625
33	Murdaralged	CVD	90%	100%	2.970	0.150	3.120
34	Nano	CVC	-	100%	-	0.150	0.150
35	Deeba	CVC	-	100%	-	0.150	0.150
36	ZahoorKot	CVC	-	100%	-	0.150	0.150
37	KotMirak(Taghikai)	CVC	-	100%	-	0.400	0.400
	A.I Centre KotMirak.						
38	Masta Mir	CVC	-	100%	-	0.150	0.150
39	Kot Bashir(Ghudakai)	CVC	-	100%	-	0.150	0.150
Tehsil Tiarza							
40	Tiarza	CVD	80%	100%	2.640	0.150	2.790
41	Osspass	CVD	90%	100%	2.970	0.150	3.120
42	KotMairajWali	A.I	-	100%	-	0.250	0.250
43	KotHaq Nawaz	A.I	-	100%	-	0.250	0.250
44	KotRemal Jan	CVC	-	100%	-	0.150	0.150
	KotRemal Jan	A.I	-	100%	-	0.250	0.250

S. No.	Location	Facility	Damage in %		Estimated Cost of repair in PKR Millions		
			Building	Material	Building	Material	Total
Tehsil Wana							
45	Wana	CVH/AI	-	-	-	-	-
46	Tatti	CVD	50%	50%	1.650	0.075	1.725
47	Shakai	CVD	50%	50%	1.650	0.075	1.725
48	Spin	CVD/AI	70%	50%	2.475	0.200	2.675
49	Ghuakhua	CVD	-	100%	-	0.150	0.150
Tehsil Birmal							
50	Birmal	CVD	60%	50%	1.980	0.075	2.055
51	Zalai	CVC	-	50%	-	0.075	0.075
52	Dhana	CVC	-	50%	-	0.075	0.075
53	KotKhanzada	CVC/AI	-	50%	-	0.150	0.075
54	KotBehram	CVC	-	50%	-	0.075	0.075
55	KotMaulvi Noor Islam	A.I	-	50%	-	0.150	0.150
Tehsil Toikhula							
56	Toikhula	CVD/AI	-	50%	-	0.150	0.150
57	Warghar	CVD	-	50%	-	0.075	0.075
58	Gulkach	CVC	-	50%	-	0.075	0.075
59	Kot Sardar Abbas	CVC	-	50%	-	0.075	0.075
G. TOTAL					**43.725**	**10.675**	**54.400**

CVH: Civil Veterinary Hospital, CVD: Civil Veterinary Dispensary, CVC: Civil Veterinary Centre and A.I: Artificial Insemination

ANNEX 3-3:

AGRICULTURAL MARKETING

The private sector plays a major role in marketing of agricultural products, except for wheat, for which the public sector is the major player. Farmers of most crops sell their produce through commission agents *(arhti),* who also generally act as wholesalers, through itinerant village dealers who purchase small quantities at the farm gate. The commission agents and wholesalers sell wheat either to the public sector procurement centers or to flour mills directly and horticulture produce is sold to retailers, exporters and departmental stores. The price of most commodities is negotiated according to the prevalent market rates. Occasionally, itinerant dealers also purchase standing crops such as maize, fodder, and vegetables. The majority of orchard owners sell their standing crop to contractors, who generally are front persons for the fruit commission agents.

As discussed earlier, overall the farming system in FATA is at subsistence level and the commercial production of crops/fruits and livestock is limited. FATA does not have regulated fruit and vegetable markets which is an enormous drawback for the farmers to effectively market their produce. In SWA, farmers buy agricultural inputs mostly in Wana market, DI Khan, Gujranwala and Lahore.

CEREAL CROPS

Cereals (wheat and maize etc) are mostly used for home consumption. Grains are used for human consumption and wheat straw, maize stalk, fresh barley is used as fodder for animals. Wheat straws are placed as heaps in the open field during summer months and they are then used as dry fodder for livestock in winter season. There is a tradition among the community of buying and selling of wheat straw in SWA. Farmers get the wheat and maize seed from local market or through Farm Services Centers (FSC). FSCs established in SWA are mainly involved in procuring and supplying of wheat seed to farmers.

HORTICULTURE

Important markets in SWA are located at Wana, Birmal, Makeen, Shakai, Sararogha, Ladha, AzamWarsak, Barwand, SpinkaiRaghzai, and Kanigurum. Wana is the major market where about 70% of the fruit sold within SWA is traded. The remaining 30% is traded in other markets in SWA.

The Wana wholesale market has about 40 fruit and vegetable shops. These shops are owned and constructed by the private sector. Government's institutional framework and regulations are not applicable to these markets. The commission agents are mostly locals. They organize the auction through outcry bidding and the highest bidders (wholesalers) purchase the produce and then supply it to major wholesale markets in Pakistan. In Wana sub division, vegetables (e.g., tomato, tinda, etc.) and fruits (e.g., apples, peaches, apricots, plums, etc.) are produced in bulk and mostly disposed of in the whole sale markets of Wana, Lahore and DI Khan as well as other national markets. Potato produced in Ladha sub division is sold in major national markets including DI Khan and Lahore. According to commission agents in Lahore and DI Khan markets, quality horticulture produce from SWA is transported to Lahore and other national markets to fetch a higher price while low graded and dropped fruits are sold in Wana and DI Khan markets

LIVESTOCK

There is no any regulated market for livestock in SWA. On average each household rears few head of goats, sheep and cows for milk and meat and these animals are not reared for commercial purposes. Generally the whole area of SWA is deficient in milk. Farmers belonging to Ladha and Sarwakai mostly rear goats and sheep for meat purpose while Wazirs in Wana sub division prefer to rear cows for home consumption of milk.

Annexure 5-1: Potential 'Perennial Flow' Sites for development of Small Irrigation Dams in SWA

S/No.	Name of Dam	Location		Catchment Area (Sq. Km) Approx.	Dam Type	Dam Height (m)	Approx. Command Areas (Acres)
		Name of Stream/River	Name of Nearest Main Locality				
Ladda Sub-division							
1	Tabai Sar Dam	ShoraAlgad/ Tauda China Algad/ Shahur River	DwaKhula	32	CFRD/Concrete Gravity	25-30	583
2	SoraRoghaDam	BaroraAlgad/ Shahur River	SoraRogha	46	ECRD/CFRD	22-25	530
3	Sheikh Zinral Dam	Tank Zam/Shahur River	Jandola	919	ECRD	30-32	2335
Sarvokai Sub-division							
4	Kundiwam Dam	TangaToi/Shahur River	Kundiwam	280	CFRD	28-30	1441
5	Karkana Dam	Wuchband Pal Algad/Gumal River	KajuriKach	44	CFRD/Concrete Dam	20-25	1023
6	Tunda Sui Dam	Tunda Sui Algad/Gumal River	Tunda Sui	27	ECRD/CFRD	20-25	430
Wana Sub-division							
7	LagharaMela Dam	NikaAlgad/ZindawarKhwar	LagharaMela	71	ECRD	20-25	529
8	Bibak Dam	DhanaAlgad/WanaToi/Gomal River	Ajm Khan Koi	154	CFRD/Concrete Gravity	25-30	554
9	Main Toi Dam	Main Toi/Shahur river	Sade Khel	38	ECRD	20-25	1532

Annexure 5-1 (Continued)

COMPLETE LIST OF Potential Sites for development of Small dams in SWA[63]

S/No.	Name of Dam	Present Status
1	Tabai Sar Dam	Site Identified
2	SoraRoghaDam	Site Identified
3	Sheikh Zinral Dam	Site Identified
4	Karkana Dam	Site Identified
5	Tunda Sui Dam	Site Identified
6	LagharaMela Dam	Site Identified
7	Bibak Dam	Site Identified
8	Main Toi Dam	Site Identified
9	Chao Tangi	PC 1 submitted to P&D FDA
10	Darbalai	Study suspended at present due to local dispute.
11	Shakai Dam	Inception report received and geo-technical investigation awaited.
12	WuchaTiarzai	Final Pre-feasibility completed.
13	Mana/Nargasi	Site identified

[63]Data obtained from FDA, Small dams division.

ANNEXURE 5-2: DEVELOPMENT OF SMALL SCALE 'ELECTRICITY BASED' BUSINESS ENTERPRISES

Considering the ultimate objective of creation of livelihood avenues for the communities of SWA, it is of the utmost importance that the deployment of the proposed renewable energy technologies for rural electrification coupled with the improvement of the existing power infrastructure in SWA, ensuring increased availability of power to the local communities of SWA, should result in the development of 'small scale' local business enterprises. The residents of the communities in SWA where the proposed rural electrification interventions are to be implemented should be supported and their capacities developed to enable them to utilize the electricity now available to 'start up' small business enterprises, catering to the needs of the village residents and wherever possible, developing products which could even be exported to other parts of the country as part of an effective value chain creation process.

This in turn is expected to result in a considerable decrease in unemployment rates with local youths, presently faced with limited choices and being vulnerable to extremist elements and agendas, would be able to develop and manage their own businesses with the promise of sustainable income generation, both for themselves and their families.

The promotion of similar small scale enterprises has been initiated and is presently being implemented as part of the 'PURE' – Productive Use of Renewable Energy project, being supported by UNDP and other international donors, focusing on the remotely located rural communities in Northern Pakistan. The PURE interventions being planned and implemented in the rural areas neighboring major settled areas such as Gilgit, Chitral and Skardu are formulated following the development and successful operation of micro hydropower projects in these areas by various development organizations, with the ideology of utilizing the electricity now available for providing the local communities with suitable and sustainable income generation avenues through the initiation of small scale businesses.

Considering the natural resources available in SWA, primarily abundance of fruits such as apples, pine nuts, walnuts and almonds, the following interventions could be explored:

- **Introduction of Solar dryers for fruit drying** and subsequent marketing to the major cities of the country.
- **Stitching centers for women**: The development of such centers which would be managed and operated by women would provide stitching and development of enable
- **Installation of Oil extraction machines** for Pine nuts, Walnuts and Almonds, found in abundance in Shakai, AngoorAdda and Mehsud areas of SWA.
- **Electrically operated machines for roasting of Pine nuts, Walnuts and Almonds.**
- **Development of computer centers:** If one room in the local village school can be spared, it can be used to place one computer and with a local from each village provided basic training on the applications of a computer and providing basic training to the youth of these communities in SWA, it would prove very beneficial in curbing extremism and enhancing avenues to communication.

In order to ensure the ownership and commitment from the communities to engage and actively develop their businesses and further expand them to cater to the demand from the other cities in the country (wherever possible), it is important to conduct a needs assessment and obtain the key areas of interest amongst the communities for development of small scale business enterprises.

Lastly, the CSOs (Community Support Organizations) and locally based NGOs in SWA, with adequate social mobilization capacity, particularly those with previous experience and expertise in capacity development of potential entrepreneurs and creation of small scale businesses would need to be utilized.

INVESTMENT OPTIONS for Development of Small scale 'Electricity based' Business Enterprises

The development of 'Electricity based' businesses on the small scale in the communities of SWA would need to be implemented as part of a systematic and well formulated strategy with the investment required for each of the key steps provided in the Table below. It is critical to the success of the support in development of small businesses for sustainable income generation avenues for the communities of SWA that a phase wise approach is adopted, similar to the approach required in the deployment of the RE based technologies for rural electrification. The recommended approach would be to initiate 'pilot' business activities in villages selected against pre-established criteria and upon their successful completion and using the lessons learnt, business ventures should be introduced to other communities in SWA.

Lastly, it must also be ensured that a 'one size fits all' approach is not adopted in selection of the potential business ventures for the communities since there might be a considerable variation in the natural resources such as fruits etc. available in the different villages of SWA, based on their geographical locations and thus the business ventures being introduced would also need to be different.

AGENCY INVESTMENT OPTIONS – RURAL ELECTRIFICATION

DEVELOPMENT OF SMALL SCALE 'ELECTRICITY BASED' ENTERPRISES[1]

PRIORITY AREA	INVESTMENT OPTION	IMPLEMENTING PARTNER	TIME FRAME	COST EST. (MILLION $)
ALL SWA Administration Units	Needs Assessment & Strategy Development for Small Scale Business Development for Communities of SWA	CSOs	SIX MONTHS from installation of power	0.5
	Selection and mobilization of suitable CSOs in each admin. unit of SWA	CSOs	SIX MONTHS from installation of power	1.0
	Capacity Development of potential & existing entrepreneurs/businesses	CSOs	SIX MONTHS from installation of power	1.0
	Support in establishment of small scale businesses	CSOs	YEARLY	1.0

Note: 1:This investment plan is based on catering to ten villages as part of the first phase of this activity of supporting development of small scale 'electricity based' businesses.

ANNEXURE 5-3: KEY INFORMATION ON DEVELOPMENT OF SOLAR PV PROGRAMME IN SWA

Considering the four possible activities mentioned in section 5-B-2 of the report and similar to the programme development approach discussed in detail for deployment of biogas units, a detailed strategy needs to be developed and implemented. Also, a clearly defined and transparent criteria needs to be formulated in order to develop the priority list for providing electrification of the village communities of SWA using the Solar PV stand alone systems. In this regard, the key issues which the strategy needs to focus on is firstly to ensure that the villages furthest from the grid are provided solar PV systems at the earliest. Secondly, once the prioritization of villages for electrification has been developed based on the criteria developed, a suitable mechanism needs to be formulated. This will ensure that the solar PV systems are adequately sized and are capable of meeting the energy needs of the households based on their size.

Thirdly, a suitable financial mechanism needs to be developed to ensure the sustainability of the installed systems through adequate O&M, while also developing the ownership of the communities which would be critical to the success of this intervention.

Similar to the proposed intervention, in 2007, the Government of Pakistan successfully implemented a rural electrification project in Tharparkar district of Sindh province. Solar home systems of three different capacities, namely 40, 80 and 120 W, were provided, based on the household size, to remote village communities located far from the grid with no possibility of having access to the grid in the near future. A 'fee for service' financing modality was adopted with the systems essentially leased to the communities and fees collected from them on a monthly basis. These funds were used to cover the payback of the system as well as cover the maintenance charges being incurred through training and engaging local operators, selected from the villages where the systems were installed.

The project in Sindh summarized above has performed well in general and has achieved its objectives and so interventions on a similar modality could be developed in SWA. However, the pitfalls faced by the project in Sindh need to be foreseen and avoided. Issues such as breakdown of the monthly fee collection system and poor O&M resulting in functionality of systems being seriously affected and causing the unwillingness of the users to pay the monthly charges need to be prevented. Furthermore, lack of suitable avenues for financing the replacement of batteries since they are now past their warranty periods is a major challenge presently facing the sustainability of the project at present which can be avoided in SWA through proper planning.

The introduction of Solar PV based systems in the village communities of SWA as well as for use to pump water would have multiple benefits. The electrification through this technology could result in the starting up of small businesses providing avenues for income generation as well as allowing students to study after dark. Furthermore, access could be provided to communication avenues such as radios and even televisions where larger Solar PV systems would be installed as has been observed in Sindh. Also, these systems would provide more hygienic and healthier conditions for women to cook indoors instead of using wood fired stoves and improve security by providing lighting at night as well as improved agricultural productivity, to name a few.

While the FATA Secretariat has appeared committed in its intention to provide the rural communities of FATA with electricity through Solar PV by allocation of considerable funds in its ADPs, minimal implementation of these projects has been observed to date. According to the FATA SDP for 2007-15, 70 million rupees have been allocated for the rehabilitation of existing tube wells and installation of new tube wells with 30 million rupees allocated for 2012-15.[64] Similarly, the FATA ADP for 2012-13 mentions the provision of solar PV for electrification in four phases in different villages with a total allocated capital of 270.756 million PKR. However, the implementation of these projects has yet to commence with these funds reallocated to other projects each year since the past several years, both due to lack of intent in implementation of these projects as well as the continuous turbulence in FATA, and particularly SWA.

The situation of tube wells operating in SWA is not different from FATA where according to the Irrigation and Hydel Directorate, there are 805 tube wells installed[65.] It is reported that half of the installed tube wells are no longer functioning due to high operating costs, low electricity voltage and the drawing down of the water table.[66] Similarly, based on the 1998 Census, only 24% of the population of SWA has access to clean drinking water. This is a surprisingly low proportion of the total population and thus makes the case for utilization of Solar PV, both for irrigation as well as to obtain clean drinking water even more relevant and requiring urgent attention, particularly if all instances of water borne diseases are to be curbed.

In order to understand the urgent need of this intervention, it should be considered as an example that the only source for irrigating the apple orchards is tube wells, which is supplemented by the rain water. Due to non-availability of electricity, tube wells are operated using diesel. The continuously increasing prices of diesel continue to increase the cost of producing apple with the farmers applying on an average nine irrigation cycles (average cost Rs 100,000 per orchard per season[67]).

---

[64]FATA SDP 2007-15

[65]*FATA Sustainable development Plan 2007-2012*

[66]Interviews conducted by staff ofIrrigation and Hydel Directorate of local farmers of SWA.

[67]*A rough calculation of tube well cost for an orchard of 1200 yusta is as follows:*

It is also worth mentioning that the FATA Secretariat, as part of its intention to provide electrification to the villages of FATA through solar PV, engaged a local consulting outfit to conduct a detailed feasibility study for provision of Solar PV systems for electrification and provision of clean drinking water in 450 villages of FATA. The feasibility study for 300 villages was completed in 2011 and is expected to form the basis for development of PC 1 document to secure funding for this intervention.

The installation of solar LED street lights could prove to be an effective and feasible option, particularly for remote village communities situated far from the grid. Considering the turbulent security situation of SWA and intermittent access of technical staff to most areas in the agency, this option would ensure the availability of lighting in the streets throughout the year while requiring minimal O&M. Also, it would not add any load to the electrical grid and thus allow the power allocated to SWA to be utilized in other areas while also greatly improving both the road and pedestrian safety in the agency at night time.

Lastly, similar to the activity of solar LED street lights described above, the installation of solar LED lights in markets in various business areas and villages of SWA would prove to be a very useful intervention considering the minimal availability of electricity at present. As a consequence, the markets would be able to operate after dark, with the communities provided increased access to goods and the traders also able to generate additional revenue due to the increased hours for commerce and trade. Furthermore, this activity is also expected to improve the security in general within the market areas by making acts of vandalism as well as petty crime harder to execute.

Single irrigation uses diesel of about Rs 10,000. There is use of 6 laborers (2 at tube well and 4 for irrigating the orchard); which is around Rs 1800 (at Rs 300 per day). Total cost per irrigation comes out to be 11800. For 9 irrigations required during the season, the cost comes out to be Rs 106200. Cost per yusta is Rs 88

ANNEXURE 5-4: KEY STEPS FOR DEVELOPMENT OF MHPs IN SWA

Purpose	**Development of micro hydropower projects for off-grid communities of SWA resulting in their social and economic progress.**		
Program objective	**Select and support design, implementation, sustainable operation and productive end use of 'n' MHP schemes in SWA**		
Outcomes	**Outputs**	**Activities**	**Risks/challenges**
Selection of MHP Schemes	MHP candidate scheme identification	Buy in and support of community	Remote locations
		Technical surveys	Data quality
		Social, economic and environmental assessments	Data quality
	Evaluation of identified MHP schemes	Analysis of financial, economic and environmental costs and social, economic and environmental benefits	Subjectivity
		Assessment of gender, productive use and livelihoods impact potential	Subjectivity
		Evaluation and ranking of candidate schemes	Decision quality
Design and planning of selected MHP	Civil works design, plan and cost estimate	Participatory planning	Community capacities
	Project design, procurement, installation plan	Design engineering and cost benefit optimization	Inappropriate size, technology
	Demand side plan	Social and productive use analysis	Over/under estimation
	Microenterprise and skill development plan	Productive use plan with micro enterprise and skill development support	Community participation
	Community capacity building plan	Capacity development planning for participation and management	Community participation
	Financial structure & financing plan	Financial and revenue planning	Fund raising
	Sources of Financing	Explore avenues for complete/partial funding of project capital cost	Compliance
Implementation of planned MHP Schemes	Construction of civil works	Technical and management assistance in execution and cost containment	Cost and time over run, quality of works

	Procurement and installation of equipment	Technical assistance, cost containment, quality assurance	Cost and time over run, specifications, efficiency
	Handing over and capacity building for management, operation and maintenance	Capacity building	Managers', operators' performance
Sustainable and socially/economically beneficial operation	Plant operation within optimum load range	Technical assistance, capacity building	Sub-optimal load, break down
	Preventive maintenance	Capacity building	Neglect
	Break down management	Technical assistance	Spare parts, technicians' availability
	Steady collection of user charges	Management capacity support	Short or inadequate collection
	Productive end use	Microenterprise, skill development and microfinance services	Community participation
	Social development stimulus	Poverty and gender focus in participation, cross-subsidization and skill development	Cultural inertia

ANNEXURE 5-5: KEY STEPS FOR DEVELOPMENT OF BIOGAS PROGRAMME IN SWA

The specific activities to be undertaken for development of the biogas programmeare grouped within following four main tasks:

Step I: Develop and implement Biogas promotion strategy amongst communities and potential technical personnel/business community of SWA.

Step II: Develop technical capacities of local technical personnel/business community and support development of local vendors and businesses in biogas sector.

Step III: Identify most suitable communities in SWA for installation of 'Pilot' biogas installations and investigate and subsequently develop most suitable economic mechanism for financing of biogas units.

It will be critical to the success of the biogas programme to structure and subsequently implement it in a phase wise manner with transparent criteria developed on whose basis the administrative units and subsequently villages will be selected for implementation of the entire biogas programme development road map. The village meeting a key criteria of being the most remotely located with no access to the grid while satisfying the livestock requirements should be provided highest priority and included in the first phase of the programme implementation.

Step IV: Conduct Feasibility studies for the installation of Biogas plants.

Prefeasibility assessments of installing biogas plants will need to be conducted to ensure the minimum livestocks requirements are met and to design and customize the biogas dome accordingly while also suggest a suitable dual fuel generator and also compute the economic analysis for installation of the recommended system.

Step V. Facilitate Installation of biogas plants.

Step VI. Develop and implement suitable O&M mechanism for installed Biogas units.

It is also important to mention that apart from utilization of biogas technology for electrification of the village communities in SWA as well as meeting their energy needs, the possibility to introduce biogas units for electrification of industrial units, particularly those containing livestock such as dairy farms could also be considered and successfully implemented as is presently the case in Punjab.

SWA's Agency Development Plan

Provided below is feedback received from USAID and information on how they have been addressed.

Comments Received From Mujahid Saleem Farooqi

No	Comment	Response
1	The Trade section of the report proposes C&W and Tribal Chamber of Commerce (TACCI) as implementing partner for Road sector interventions. However, there is no discussion on why these are the most suitable implementing partners or what will it take to make them suitable partners i.e. their existing capacity and capacity building needs.	Noted and more details/analysis added.
2	The Agriculture section proposes establishment of Farm Services Centres. While it is mentioned that two FSCs already exist in the agency, there is no discussion on their effectiveness, operational modalities, role of communities etc. Is there is a need to improve the operational model to make these centers more effective or we have evidence in support of the system in place? The report is silent on operational aspects.	Noted and more details/analysis added.
3	The Minerals section of the report provides a list of institutions/organizations active in the sector with no information whatsoever on their relative importance for SWA, existing capacities and capacity building needs. Similarly, the report is silent on whether there is a need for policy reforms to develop the sector? Tribal Chambers and Mine Owners Association are proposed as implementing partners but there is no information on their capacity and what makes them most suitable implementing partner.	Noted and more details/analysis added.

4	Lastly, as we all know, military is a key stakeholder in SWA present scheme of things. There is no clear mention of their present role in development and how we can leverage military expertise in short-medium term to promote economic growth and facilitate transition to civilian authorities. Can we leverage military's technical expertise to build capacity of departments/organizations responsible for operations and maintenance of infrastructure? This merits some discussion keeping in view present situation and weak institutional setup.	Noted and more details/analysis added.

Comments Received From Mark Parkinson

No	Comment	Response
MP1	How many villages?	Data reported is at tehsil level only.
MP2	What is the economic role of women? The socio-economic section needs to address gender issues and disparities in the socio-economic situation for girls and women given the cultural restrictions on their freedom of movement and socio-economic integration.	This is not in the agreed scope of work.
MP3	Any data on the share of GDP from pastoralism, dry land ag, irrigated ag, small manufacturing, mining, etc. Also, there is no tie to the opportunity for an expansion of settled ag as underlies the analysis below for the water sector. Also, what are the crops grown? Do they correspond to value chain opportunities?	This data is not available.
MP4	On August 20, 2011 Zardari extended the provisions of the Act to the FATA	Noted and corrected
MP5	This section should be reworked to address the law and order/militancy/insurgency situation in the agency rather than looking just IDPs who have left the agency and their repatriation. (though the IDP issue could/should also be a point in that section).	The section was developed as per the request of USAID.

MP6	How does control over water resources break down according to tribal affiliations?	Data not readily available
MP7	Geographical area 24.3% of FATA, s and FR's Geographical area?	Noted
MP8	Westerly disturbances contributed 70% to precipitation and the rest was attributed to monsoonal disturbances?	Corrected
MP9	No dams/reservoirs?	There is no dam on Tank Zam. There is a dam on Gomal zam.
MP10	What is the data for the reservoir/dam?	Data not readily available
MP11	Tribal distribution?	The data is not available
MP12	Upstream issues/overlap with other administrative units?	Hill Torrents widely spread in the SWA. And it covers both upstream and downstream and follows hydrologic boundaries. Gomal Zam largely in Wana sub-division and Tank Zam in Serwekai sub-division. Figure 2-7 is referred which will make this point clear. It is already in the text above.
MP13	Well managed?	Noted
MP14	PHED responsibility?	Noted
MP15	Problems?	Noted
MP16	SWA data?	It was an error. It is SWA data. Correction made in the text. For Pakistan it is 62%. Initially I put for Pakistan and when I got the data changed the figure but Pakistan could not be changed to SWA. See the SWOT analysis Table.
MP17	Is this supposed to be here ?	I think so. This described the overall investments options for Irrigation and the approach.
MP18	Why is this only a threat for this type of water use?	Noted
MP19	Income? Share of GDP?	Data not readily available

MP20	Data?	Data not readily available
MP21	These are all in SWA?	Yes
MP22	What on earth is pre-basic seed?	Pre basic seed is the class of a seed being produced by the breeder in consultation with the certification authority. The next step of pre basic is basic and then certified seed.
MP23	Poor resources for reclamation and inputs In time availability of inputs?	Farmers have limited resources like machinery etc to reclaim the Culturable waste land and other inputs to add for reclamation. Sometime either the road is blocked or bad weather or shortage in the market cause delay of availability of inputs
MP24	Political administration ban fertilizer and sowing of maize crop any time ?	Urea in any crop including maize crop is banned for security reason.
MP25	Need some analysis on the impact of road improvement on market access.	Addressed in the text
MP26	Exactly! Also, maybe some data on condition of delivered goods/wastage caused by road conditions	
MP27	NEED DATA, weights carried, etc.	Data not available
MP28	Impact?	
MP29	What do you mean expansion?	Explained in text
MP30	Doesn't the private sector respond to this need currently?	These facilities are not usually available
MP31	How ?	Addressed in text
MP32	Is this the total number of villages in FATA?	Yes
MP33	Out of how many?	Data for number of villages is not available
MP34	So with the figure above in mind, are there approximately 125,000 households in SWA?	There is no data to confirm the exact number of households at present in SWA. Based on interviews and discussions with relevant authorities, 25 % of the households in SWA have access to electricity, while the exact number of households is not known.
MP35	Markets?	Addressed in text
MP36	This takes on added significance when considered with the fact that steel mills operating in Pakistan rely mostly on imported manganese ore !!	

Comments received from Muhammad Anwar

No	Comment	Response
MR1	How about access to inputs, fertilizer is banned there?	Use of Urea is banned. Other fertilizers are available in Wana market.
MR2	There is barely any mention of wheat and maize in the figure.	Figure shows main crops concentration in SWA. Maize is a major crop and highlighted. Legend indicates the main crops grown in SWA
MR3	Two contrasting statements	Not contrasting. Maize yield in SWA is higher than other agencies could be due to suitable climate for this crop. While wheat yield in SWA is less than other agencies could be due to poor quality of wheat seed and lack of improved technology
MR4	Income? Share of GDP?	Official data is not available
MR5	There are apple orchards on 15000 acres only on zarmilan plain	Could be. Official data is available at Agency level
MR6	Is there data available for individual fruits production?	Yes
MR7	Data?	There is no poultry specialist available in SWA. However, few specialists are in head quarter Peshawar.
MR8	These are all in SWA?	FSCs are at SWA level while others at national level having mandate for the country
MR9	How many in SWA	Already mentioned page # 34. There are two FSCs in SWA
MR10	These have been recently extended to FATA	These are at national level and applicable to FATA products in settled areas. Also assuming to be extended to FATA.
MR11	What is pre-basic seed?	Pre basic seed is the class of a seed being produced by the breeder in consultation with the certification authority. The next step of pre basic is basic and then certified seed.
MR12	Poor resources for reclamation and inputs In time availability of input?	Farmers have limited resources like machinery etc to reclaim the Culturable waste land and other inputs to add for reclamation. Sometime either the road is blocked or bad weather or shortage in the market cause delay of availability of inputs

MR13	Political administration ban fertilizer use in any crop including maize crop ?	Urea in any crop including maize crop is banned for security reason.
MR14	Any post harvest losses figure?	Generally it is 30% postharvest losses occur due to couple of factors including poor management, packing, transportation, harvesting techniques, variety etc.
MR15	How about linking apply producers with Nestle for nector/juice for instance as contract farming	This needs further assessment whether Nestle or other private companies could extend their facilities.
MR16	Certified root stocks	Certified rootstock and mother plants would be arranged from KPK
MR17	Provincial representatives of Federal Seed Certification and Registration Department	Their services are not extended to FATA
MR18	Certified	True to type
MR19	Controlled environments/structured farming	Yes, written in second line
MR20	How about cold storage?	Cold storage is not feasible as 1) Apple varieties grown in SWA have weak storage capabilities, 2) use of cold store round the year is a question, 3) Strong bond with Lahore market and farmers prefer to sell directly, 4) Fetch comparatively good price without store as the variety is early in SWA
MR21	What's the estimated loss owing to low nutrition	Nutrition is the basic entity of life. It depends on situation. If nutrition is completely finished then either animals are slaughtered, or sell or die. If poor nutrition, then yield of milk and meat is reduced. This weak nutritional factor further cause diseases etc.
MR22	Multicut and drought resistant	Yes
MR23	How much is the estimated productivity loss owing to parasites?	Combination of all disease and parasite factors cause in reduction of 20 to 30 % milk and meat production and ultimately animal die
MR24	Multi-strain vaccines	Agreed
MR25	I think its more important to focus on breeds with wool that is in demand in the market. That's value chain approach along with other skills	Breed and skills both are mentioned