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AFGHANISTAN ALTERNATIVE LIVELIHOOD PROJECT – SOUTHERN REGION

Fish Farm Feasibility Study
Helmand and Kandahar Provinces

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TABLE OF CONTENTS

	page
EXECUTIVE SUMMARY	ii
1. Background	1
2. Markets.....	1
2.1 Lashkargar.....	1
2.2 Kandahar.....	3
2.3 Kabul.....	5
2.4 Other market information.....	7
3. Potential farm areas	8
4. Potential species	10
5. Costs and profitability	11
6. Project components required.....	12
6.1 Fry supply	12
6.2 Technology transfer.....	14
7. Other	14
7.1 Stocking the Dalah dam	14
7.2 Ice supplies.....	15
7.3 Fertiliser supplies.....	16
	Appendices page
APPENDICES	1
Appendix 1 - Fish Farm Feasibility Study, Afghanistan – Scope of Work	2
Appendix 2 - Minutes of Meetings	3
Appendix 3 - Freight costs, distances & travel time	31
Appendix 4 - Climatic data, Kandahar and Lashkargar	32
Appendix 5 - Population data, Kandahar & Helmand ¹	33

Note: exchange rate January 2006: Afg 50 = US\$1

EXECUTIVE SUMMARY

1. There is strong market demand for fish in Helmand, Kandahar and Kabul. Demand is unsatisfied, but is also very price sensitive. In general, people value fish more than chicken, equal to beef and less than lamb.
2. Fish is mainly only bought in winter, though there is some limited demand in summer. This consumer pattern may change if quality supplies become available in summer.
3. It is estimated that 500 kg of farmed fish per day over a 5 month season could be sold in and around Lashkargar. This represents the production from 20-25 ha of ponds.
4. It is estimated that 1000-1300 kg of farmed fish per day over a 5 month season could be sold in and around Kandahar. This represents the production from 40-65 ha of ponds.
5. For production above these levels, fish could be profitably shipped for sale in Kabul, where an estimated 1000 kg per day could readily be sold.
6. Fish could be sold wholesale at Afg 80 per kg. This would generate an operating profit on a 1 ha pond of Afg 211,000 per annum, or Afg 24,000 pa on a 0.1 ha pond. Fish sold retail at Afg 110 per kg would add Afg 120,000 to the operating profit of the 1 ha pond and Afg 12,000 to that of the 0.1 ha pond. It is noteworthy that an existing fish farm in Kunduz has recently been selling its production, retail, at Afg 130-150 per kg.
7. There is widespread interest in both provinces to start fish farming businesses. What are needed are supplies of fry, technical assistance and in some cases, credit.
8. There are many areas suited for successful fish farming, particularly along the irrigation canal routes. There is an attractive opportunity for people to grow fish in ponds constructed between the irrigation supply and the agricultural crops. In this way there is no net use of water and waste products from the fish act as nutrients for the crops. Ponds could also be constructed in other areas away from the canals, using tube well water.
9. A key component needed is a hatchery. A good location would be at the foot of the Dalah dam, 40 km from Kandahar city. Here there will be a year round dependable water supply and there is existing security cover. The site is within easy delivery distance for both provinces.
10. All the main non-native species that would be candidates for culture (common carp, grass carp, silver carp, bighead carp, rohu, mrigala, catfish) have been previously introduced to Afghanistan, and some are known to have established breeding populations in the local rivers.
11. There is an additional attractive opportunity to stock fish in the Dalah dam, to take advantage of the natural productivity of the water there.
12. Other supplies such as fertiliser, agricultural by-products suitable as feed for fish, as well as ice, are all readily available locally. Currently there is excess capacity for ice production in both Lashkargar and Kandahar.
13. Skilled technicians to run the hatchery and extension work and train a local team, could be readily recruited from Bangladesh, India, Pakistan or Iran. Kandahar University staff are keen to be involved and could co-ordinate or assist training efforts.
14. It is unlikely there is any attractive export market for fish produced in Helmand and Kandahar.
15. Current handling of fish for market is of a very poor standard. Any project should include capacity building in fish handling, development of value added products (such as fillet) and preservation of the cold-chain. A demonstration retail outlet in Kabul offering hygienic processing as well as good quality products to the retail and catering sectors, would be a useful project component.

1. Background

Chemonics International is implementing the Afghanistan Alternative Livelihoods Program/South (ALP/S) contract during 2005-2009. The ALP/S will provide jobs, develop legitimate business and agriculture, and improve infrastructure in the Helmand and Kandahar provinces in southern Afghanistan. Helmand is one of the main poppy-producing regions of Afghanistan and the program will be a key part of an overall poppy eradication program. Although the program will not have any counter-narcotic or poppy eradication elements, it is intended to soften the blow for those affected by these programs and provide them an incentive to become engaged in legal commercial and agricultural activities.

Activities under ALP/S will focus on physical infrastructure construction, small and medium enterprise development, agricultural and agribusiness assistance, and building the capacity of local implementing partners. This program is part of a high profile US government initiative, at the nexus of international development and foreign policy.

Fish Farming has been identified as one of the potential alternative livelihood activities that the ALP/S project could promote. To examine this potential in detail, a Fish Farm Specialist, Mr David J Currie was contracted through Abt Associates Inc., to carry out a study of fish markets and farming potential in Lashkargar (Helmand Province) and Kandahar (Kandahar Province) during the period 7 – 29 January 2006 (see Scope of Work - Appendix 1). This report presents the findings of that study.

2. Markets

2.1 Lashkargar

In Lashkargar, meetings were held to discuss market supply, demand and pricing with: specialists at the Ministry of Agriculture; two owners of (inoperative) district fish ponds; a professional fisherman; the owner of the principal retail fish outlet in Lashkargar; two restaurant owners; a butcher; and, 10-15 members of the public.

Fish is widely popular among the people of Helmand. Most of the fish being consumed in Lashkargar is caught in the Helmand River, mainly around Naway and Grishk. Traditionally local people only eat fish in the winter – it is considered too ‘heating’ a food to be eaten in summer and also is believed to carry worms in the hot months.

A popular activity is to arrange a picnic for a group of friends near the river and barbecue fresh-caught fish. Rafor, the professional fisherman interviewed, is typically paid Afg 2000 for a few hours work assisting with the fishing operations for such picnics.



Good quality common and grass carp from the Helmand River

There are two or three established retail fish outlets in Lashkargar town.

The owner of the principal one has relatives who buy fish about 1 day's drive upriver at Bernarder in Garmser district and bring it to Lashkargar by truck. It is loaded live onto the truck in tanks of water (and presumably dies in transport). It is held at the Lashkargar shop without ice, but if necessary it is put in a freezer for extended sale. The shop handles mainly "Sheermahi" (probably *Schizocypris* sp.), "Yacarpee" (common carp *Cyprinus carpio*) and "Patreye" (no samples available, but possibly, rohu (*Labeo rohita*)). The "Sheermahi" the shopkeeper had in



'Sheermahi' in Lashkargar

stock was of medium to poor quality. His relatives handle approximately 450 kg per day, and bring 80-100 kg daily to Lashkargar, selling the rest on the way. His selling price in January was Afg 111 per kg, for whole gutted fish. He explained that the retail price was around Afg 56 per kg at the start of the season in late September, but holds at Afg 111 per kg for most of the period through to mid April. He estimates he could sell up to 270 kg per day in Lashkargar. For larger quantities he would need to sell in the district villages.

One restaurant owner interviewed is often asked for fish by his customers, but fish is too expensive locally for him to fit to his system of offering meals for Afg 50. However 'meat for meat' he would be willing to buy fish at the same price as he pays for lamb. He would pay more than for beef or goat (or chicken) as 'people like fish a lot'. A street stall fish fryer interviewed uses about 45 kg of small (20 cm long) "Sheermahi" each day and sells them fresh at Afg 90 per kg, or fried at Afg 110 per kg.

The professional fisherman said he sells his catch at Afg 56 per kg and has never seen prices above Afg 78 per kg, despite what other traders were reporting.

Beef retails in Lashkargar at Afg 124-130 per kg with bone, Afg 160 per kg without bone.

Goat retails at Afg 170 per kg with bone.

Lamb retails at Afg 160-170 per kg with bone.

Chicken (US origin frozen, imported via Dubai) retails at Afg 75-80 per kg.

(See Appendix 2 for detailed minutes of the meetings held)

Conclusions: there is adequate evidence that the people of Lashkargar and surrounding districts like eating fish, prefer it to chicken and like it possibly as much as lamb. They only eat fish in the winter months, however. At a retail price of Afg 110 per kg for whole fish, 200 kg per day of farm produced fish could probably be sold in the city and a further 300 kg per day in the surrounding districts. Quality from properly run farms would be closer to fish caught fresh from the river, rather than the deteriorating product currently on sale at the retail outlet, and so demand and prices would be expected to grow.

500 kg per day of fish sold over a 5 month season represents the typical production from around 20-25 ha of fish ponds (at 3-4 MT/ha.yr). It is likely farmers could sell at a price of at

least Afg 80 per kg wholesale, should they opt not to handle the retailing themselves. A one hectare farming operation would thus generate Afg 240-320,000 in wholesale income, representing an estimated Afg 130-210,000 in operating profit.

Helmand farmed fish production beyond 500 kg - 1 mt per day throughout the winter season would need to seek markets outside the province, or the sale price, 'meat for meat' would need to move closer to that of chicken. There is evidence that demand locally is highly price sensitive. At a price equivalent to chicken 'meat for meat' (around Afg 40 per kg for fish) the market demand in Helmand could reach 10 mt per day, (based on 100 g per capita per week, 5 months, CSO 2004 provincial population estimate of 776,300). This price would not offer an adequate operating margin to farmers. However, there is likely to be an inverse relationship between price and demand, and as prices move down from Afg 80 per kg towards Afg 40 per kg, demand would be expected to increase from 500 kg per day towards 10 mt per day.

2.2 Kandahar

In Kandahar, meetings were held to discuss market supply, demand and pricing with: the Provincial Director of Agriculture; the Provincial Director of Irrigation; owners of two (inoperative) district fish ponds; the owners of two leading restaurants; the owners of four fresh and fried fish stalls; a supermarket selling imported frozen fish; a butcher; and, 8-10 members of the public.

Fish is not as popular among the people of Kandahar as it is in Helmand. It is seen as expensive compared to other meats. Most of the people interviewed rated it higher than chicken, but in contrast to Lashkargar, they considered it less desirable than goat or beef and much less desirable than lamb. The fish seen in the local markets was of very low quality. Most of it was small (20 cm) 'Sheermahi' said to have been brought by traders from Lashkargar, Grishk, the Dalah dam, or the Kajaki dam. As in Helmand, and for the same reasons, local people traditionally only eat fish in the winter. There are reports of better quality fish from Pakistan, including carp, being sold on the Kandahar market, but none were seen during the January survey.

Two stall owners selling fresh and fried 'Sheermahi', in each of two separate parts of the city were interviewed. They each handle around 90 kg per day and buy at Afg 22-47 per kg for small fish of 20 cm length and around Afg 55 per kg for larger fish of 30 cm size. They sell most of the fish fried with about a 50% mark-up. There are many areas across Kandahar city where there are fried fish stalls of this kind, each area handling perhaps 200 kg per day. Several metric tons of small 'Sheermahi' are probably sold each day in the city.



Kandahar shop selling fried and fresh fish

Neither of the two leading restaurants visited offered fish on their menu. One owner commented that he would offer fish if it were available at a competitive price because ‘people like fish’. ‘Meat for meat’ he would rate it higher than chicken, possibly equal to beef but certainly lower than lamb. At a price that would fit his system of offering meals for Afg 65, he estimated he could use 200-300 kg of fillet per month in his restaurant. He would prefer fillet as it would save him work and he could see how much edible fish he was getting for the price.

The second restaurant was owned by a returned exile entrepreneur, whose aim was to establish a ‘fast food’ type restaurant in a more modern atmosphere than the typical Afghan eating house. He did not offer fish because the supply from local traders or from Pakistan was not sufficiently reliable and the quality was uncertain. With a regular, quality supply at the right price however, he would be keen to offer it as ‘he could prepare 5 different style dishes with fish’, and ‘people like fish’. He would prefer fillet to whole fish and estimated at a price similar to chicken ‘meat for meat’ he could use 50 kg per day. He estimated there were around 100 restaurants in Kandahar city but only two or three ‘modern’ style ones like his.

The ‘supermarket’ concept – a shop selling a wide range of groceries and household goods - is new to Kandahar. The one visited included in its stock, frozen US origin chunk tuna at a price of Afg 120 for 1.22 kg – about a quarter of the price per kg of canned tuna, of which they sold 2-3000 tins per month. They would be interested in quality fish supplies, mainly for sale to foreigners, but would prefer it filleted and packaged.

Beef retails in Kandahar at Afg 120 per kg with bone, Afg 140 per kg without bone (a little cheaper than in Lashkargar).

Lamb retails at Afg 200 per kg with bone (markedly more than the Afg 160-170 per kg in Lashkargar).

Chicken (US origin frozen, imported via Dubai) retails at Afg 70 per kg (a little cheaper than in Lashkargar).

Goat meat was not available.

(See Appendix 2 for detailed minutes of the meetings held)

Conclusions: there is evidence that the people of Kandahar like fish but not as much as the population of Lashkargar - and they rate it lower compared to other meats. As in Lashkargar, fish is generally eaten only in the winter months. Several metric tons of fish per day could be sold in Kandahar city, but most likely only at a price that would be uneconomic for farmers. Given the population of the city (CSO 2004 estimate of 432,300 compared to 85,800 in Lashkargar district) however, and the level of economic activity, there should be a sufficiently large upper income group that would pay a better price than the fish friers for a quality product. It is estimated that at least 500 kg per day of quality farmed fish could be sold in Kandahar city at a price of Afg 80 per kg and a further 500-800 kg per day in the surrounding districts. This represents the production from 40-65 ha of fish ponds.

As discussed for Lashkargar, as the sale price of fish falls towards that of chicken, ‘meat for meat’, demand will rise towards a level of around 10 mt per day for the province.

2.3 Kabul

In Kabul, meetings were held to discuss market supply, demand and pricing with: the Assistant Director of Aquaculture; the FAO of the UN National Fishery Supervisor; the management of two leading hotels; the owners of three restaurants; the owners of six fresh and fried fish stalls; two supermarkets selling imported frozen fish; a butcher; and, 8-10 members of the public.

Fish is widely popular among the people of Kabul. Most of the fish being consumed is brought from Pakistan for sale at retail outlets in the city. The main area for these is in New City Road where there are 12 -15 fresh fish stalls in operation. Another 2 stalls were examined in Daykhonan St.. In January, about 50% of their stock was catfish (probably a Wallago or Callichrous catfish), 45% silver carp (*Hypophthalmichthys molitrix*), and a few small grass carp (*Ctenopharyngodon idella*). The retailers buy from a trader who brings fish in bulk from Pakistan. They pay Afg 80 per kg for the fish and sell at Afg 120-160 per kg. They only sell fish in the winter months and most of them change to ice cream selling in the summer. The stalls interviewed sell 35-100 kg per day for a total volume for both areas of an estimated 600-800 kgs per day. The quality of the fish on sale was medium to poor and it appeared to have been held partially frozen overnight.



Fish stall in New City Road, Kabul

In Lashkargar, the fish shop owner and fishermen had both commented that traders regularly come down from Kabul looking for fish supplies, indicating that there is demand beyond what is being imported from Pakistan, or that traders are seeking alternative sources.

Fish caught from a river in the south of Kabul near a public recreation park are reported to be barbecued by the fishermen and sold to visitors for as much as Afg 500 per kg.

The two international standard hotels investigated do not offer fish currently, mainly because of concerns about quality. They report that customers often ask for fish and that they would place it in their popular buffet menus if reliable quality supplies were offered. The GM of one hotel explained that they buy lamb and beef as a whole carcass on the day of slaughter and butcher it themselves. They thus have control over hygiene and quality. In contrast they can not be sure if the fish in the market has been handled well or repeatedly thawed and re-frozen, so it is too risky to offer their customers. If quality fish were available, they would prefer supplies of fillet and could each use several hundred kg per month.

Two of the three restaurant owners interviewed do offer fish on their menus but they only use imported product bought from the two supermarkets that cater for the foreign community. Supplies are erratic however and prices are too high for them to use more than a limited supply. Their customers ask for fish and they would be keen to offer it if a quality product, preferably filleted, were available at a competitive price.

The two supermarkets that cater mainly for foreigners had limited supplies of imported frozen fish and at elevated prices. In one, cod fillet was at Afg 2040 per kg, hake fillet Afg 1280 per kg and whole trout Afg 940 per kg. In the other, cod fillet was at Afg 790 per kg, haddock fillet Afg 670 per kg, Nile perch Afg 600 per kg and whole trout Afg 700 per kg. It was not possible to establish sales volume per month. Clearly there is an opportunity to offer quality fish fillet produced in local fish farms at a much lower price.

Beef retails in Kabul at Afg 160-170 per kg without bone, (Afg 20-30 per kg higher than Kandahar and Afg 10 per kg higher than in Lashkargar).

Lamb retails at Afg 210 per kg with bone (Afg 10 per kg higher than in Kandahar and Afg 40-50 per kg higher than in Lashkargar).

Chicken (US origin frozen, imported via Dubai) retails at Afg 90 per kg (Afg 10-20 per kg higher than in Kandahar or Lashkargar).

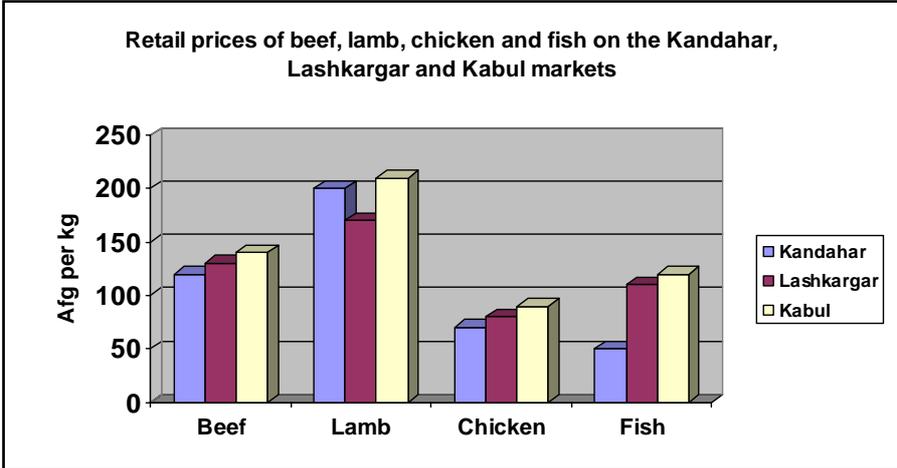
(See Appendix 2 for detailed minutes of the meetings held)

Conclusions: there is good demand for fish in Kabul, currently being met by imports from Pakistan, with at least 1 mt being sold per day. At a wholesale price of Afg 80 per kg delivered to Kabul, it is likely that much of this supply could be replaced by farmed fish from Kandahar and Helmand.

Freight costs for a 5 mt truck are quoted at Afg 18,000 from Lashkargar to Kabul and Afg 10,000 from Kandahar to Kabul. Transport to Kabul of 1 mt of iced fish in a consolidated load would thus cost less than Afg 5-6 per kg, possibly as low as Afg 3 per kg from Kandahar, and so freight costs present no obstacle to Helmand and Kandahar producers shipping product to the capital. (see Appendix 3 for freight cost details)

1 mt of fish marketed per day during the 5 month winter season, represents the production from some 40 ha of ponds. As for Kandahar and Helmand, the market in Kabul is likely to be highly price sensitive, and much larger volumes could be sold as the price falls towards that of chicken.

There is a further market opportunity in Kabul to sell filleted fish to hotels, restaurants, higher income earners and foreigners. A small demonstration retail outlet established in the capital, where fish was prepared and displayed hygienically and then sold direct to the public or delivered to hotels and restaurants around the city, could probably move 50-100 kg of fish per day. It would provide a small business opportunity for a local entrepreneur and serve as a model for improved food handling practices.



2.4 Other market information

Kunduz: there is an existing fish farm operating in Kunduz. The owner's intention had been to produce fish for the Kabul market, but he has been able over the past year to sell all of his production in and around Kunduz. He estimates demand in the 7 districts of Kunduz at 400 kg per day. He receives the highest price for catfish, Afg 180-250 per kg and sells grass carp, silver carp and rohu (*Labeo rohita*) at Afg 130-150 per kg. He has investigated the prospects for farming in Kandahar and Helmand and estimates the demand in that area at 1000 kgs per day upwards.

This suggests that farmers in Kandahar and Helmand could achieve sale prices markedly higher than the Afg 80 per kg estimated as a base wholesale price in the discussion above.

Obstacles to market growth, and opportunities: traditionally fish is only eaten in Afghanistan during the winter months. This is partly due to practical and partly due to cultural reasons. The reputation that fish has for carrying worms in the summer may be mainly the result of poor handling practices, the lack of use of ice and the fast deterioration of fish quality in the hotter weather. Improved handling practices may resolve this obstacle. The cultural objection that fish is a 'heating' food may be harder to overcome, but there is evidence that some fish is bought and sold throughout the summer both in Kabul and in the south in Helmand and Kandahar, and it is possible that the summer market could be expanded.



Kandahar – fish quality and handling practices are poor

Demand is very price sensitive. The market history of chicken in Afghanistan is instructive. Before imports of frozen chicken from the USA via Dubai began some years ago, chicken was priced at around Afg 200 per kg and was eaten by very few people. Since the introduction of the frozen imports that retail at Afg 70-80 per kg, consumption has expanded rapidly and now perhaps a majority of people eat chicken at least once or twice a week.. Generally Afghan people like fish and so there is potential to expand the market considerably as farmers become more efficient, narrow their margins and offer product increasingly close to the 'meat for meat' price of chicken.

Imports from Pakistan: hard data on imports is hard to obtain. But an NGO based in Jalalabad, ARCO, did investigate the situation with the Customs Department on the border at the request of FAO and reported an estimated 4000 mt of fish imported legally during the 6 month winter of 2004-2005. Adding an estimate of 1000 mt for undeclared imports would lead to a total of around 5000 mt, or 27 mt per day. This would represent the production from 1200 -1700 ha of potential Helmand and Kandahar fish ponds, setting a much higher target level for expansion of the sector than was gained through the selective interviews at the limited number of retail outlets.

Comparative value of fish to other meats: an interesting observation was made by one interviewee which is useful in understanding the price-demand sensitivity for fish. This was that locally, 1 kg of sheep meat is typically taken and prepared as a stew which will then feed a family of 8-10 people. 1 kg of whole fish will only yield ‘meat’ that will feed half that number, or less. There is no tradition of using the head and other parts of the fish in soups etc., so with a fillet yield of around 35% for most fish, there is a lot of wastage. To be competitive then, the price of whole fish can not exceed around 50% of the price of other meats, considered equally desirable.

Exports: it is unlikely there is any significant export opportunity for fish. The neighbouring countries that could be reached by road from Helmand or Kandahar – Pakistan and Iran - have major farmed fish production themselves, and produce at costs that currently enable them to export profitably to Afghanistan. There is demand in Europe and the USA for quality fish, but the prices on offer would not make processing and export of freshwater fish from southern Afghanistan economically attractive.

3. Potential farm areas

There are many areas suited for successful fish farming in both provinces, particularly along the irrigation canal routes. In these locations there is a dependable supply of water for nine months of the year, March through November, encompassing the main growing season for fish. There is an attractive opportunity for people to grow fish in ponds constructed between the irrigation supply and the agricultural land. In this way there is no net use of water and waste products from the fish production contribute nutrients to the crops.

In most cases water inflow is only needed to the ponds during the growing cycle to make up losses to seepage and evaporation, plus occasionally to flush ponds if mistakes are made in the fertilisation regime, (that can lead to algal blooms and oxygen deficiency). However a dependable supply of water for when it is needed can make the difference between success and the loss of a fish crop. Water can also be flowed through the ponds, to allow intensity of production to be raised and to extend the growout operation to higher value fish such as catfish.

In Kandahar the Arghandab irrigation canal runs 23 km from the Arghandab river to the outskirts of Kandahar city. Alongside it is a well maintained, two lane asphalted highway offering good access. To the west of the road and canal, the land slopes down into agricultural areas producing mainly pomegranates, mulberries and grapes. There are also housing areas and adobe walled compounds, often currently with no buildings within them. Many of the owners of properties in these areas could construct ponds on their land, taking water from the Arghandab



Arghandab irrigation canal to the left of the road, (currently drained for annual maintenance) potential fish pond areas to the right

canal, using it in their ponds, and then discharging into the plantations, all by gravity flow, with no need for pumping and its associated costs.

In Helmand, there are similar areas taking water from the Bughro irrigation canal, which runs from the Kajaki dam, the largest dam in Afghanistan. For instance at Marjah, an hour and a half's drive west of Lashkargar, water from the Bughro canal drops 3-4 metres over two waterfalls within a distance of 400 m from the canal and then goes to feed the large irrigation area south of Marjah. Here too, ponds could be constructed between the irrigation supply and the agricultural plain, with all the flow being achieved by gravity and with no net usage of water.



Water from the Bughro canal dropping 3 m down to the Marjah agricultural area

Kandahar offers a preferred location to Helmand for a start-up project. Although fish seems less valued in Kandahar than in Lashkargar, Kandahar's much larger population and proximity to the proposed hatchery site at Dalah, make it a more appropriate location for initial development.

(see Appendix 2 for detailed minutes)

There are known to be fish living in the irrigation canals and it is unlikely the water would not be suitable for use in fish ponds. Ponds could be constructed in other areas away from the irrigation canals if there is a reliable supply of tube-well water, and if this proves to be of suitable quality. The tube-well water in the area does however contain significant levels of dissolved salts, and its suitability for fish culture will depend on what precisely these are. It was not possible during the January survey to obtain data on the chemical analysis of local tube-well water. This can be handled on a case-by-case basis with specific tube-well water samples being sent for analysis, if a proposal is made to use it for fish production in a particular location. Most tube-well water is likely to be usable, possibly after a period of ageing after it has been pumped to the surface.

There are reported to be many small irrigation dams of 10-30 m² area and 1-1.5 m depth in the districts of Helmand outside Lashkargar. These are kept at least partially filled during the growing season and in many cases may be suitable for small scale production of fish, for home use or local sale. There are various reports of the owners of such dams catching fish from the river and stocking them into the dams, but with limited success. Supply of more suitable fingerlings and of technical assistance would allow these irrigation dam owners to be more successful.

4. Potential species

Most of the carp and catfish species traditionally farmed in India and Pakistan would be suitable for growing out in Helmand and Kandahar. At least common carp (*Cyprinus carpio*), grass carp (*Ctenopharyngodon idella*), silver carp (*Hypophthalmichthys molitrix*), bighead carp (*Aristichthys nobilis*), rohu (*Labeo rohita*), Mrigala (*Cirrhinus mrigala*) and an undetermined catfish species (probably a Wallago or Callichrous catfish) have all been previously introduced into Afghanistan and some (common and grass carp for instance) are reported to have established breeding populations in local water bodies such as the Helmand River. The Ministry of Agriculture in Kabul have records from a survey as far back as 1968 reporting the stocking of Chinese carp into Afghan rivers.

Further data is needed on the water temperatures month by month, likely to occur in ponds constructed in Helmand and Kandahar, for a further decision to be made on the most profitable species mix to be used. In addition further research is needed to identify which non-native species are indeed already established in natural water bodies and for which the environmental risks posed by further introduction are therefore limited.

It is anticipated however that there will be no difficulty in identifying species that would offer a profitable stocking mix for farms in the region.

It may also be useful to investigate the culture characteristics of common native species such as the “Sheermahi” (probably *Schizocypris* sp.), which already has wide market acceptance.

5. Costs and profitability

Estimated capital and operating costs for building and operating fish ponds in Helmand and Kandahar are presented in the following table. They include a number of assumptions that need to be further verified. Costs are shown for a 0.1 ha ‘domestic’ pond that might be built and operated on a family basis, and also for a 1.0 ha ‘commercial’ pond that could be a unit in a larger production operation.

	0.1 ha ‘domestic’ pond	1.0 ha ‘commercial’ pond
Construction costs (pond) a/ b/	Afg 124,800	Afg 640,000
Construction costs (gates)	Afg 10,000	Afg 20,000
Sub-total	Afg 134,800	Afg 660,000
Operating costs per year		
Fry c/	Afg 5,000	Afg 50,000
Fertiliser d/	Afg 426	Afg 4,260
Labour e/	Afg 0	Afg 27,000
Harvest ice f/	Afg 2,400	Afg 24,000
Delivery to market g/	Afg 400	Afg 4,000
Sub-total	Afg 8,226	Afg 109,260
Sales h/	Afg 32,000	Afg 320,000
Operating profit	Afg 23,774	Afg 210,740
Less 10% amortization on capital	Afg 13,480	Afg 66,000
Less 10% interest on capital plus operating costs	Afg 14,303	Afg 76,926
Net profit	Afg -4,009	Afg 67,814

Assumptions:

a/: 25m x 40m pond, 2 m deep, 2:1 slope, 0.5m crown, → cut/fill 624 m³ @ Afg 200 per m³

b/: 67m x 150m pond, 2m deep, 2:1 slope, 0.5m crown, → cut/fill 3200 m³ @ Afg 200 per m³

c/: 5000 stocked per ha @ Afg 10

d/: 10 kg urea @ Afg 13 per kg and 1 kg TSP @ Afg 12 per kg: per ha per week, 30 weeks

e/: for ‘domestic’ pond - free family labour; for ‘commercial’ pond. ½ fulltime @ Afg 200 per day, 9 months

f/: 3:1 ratio, 4 mt per ha harvest, Afg 2 per kg pondside

g/: Afg 1 per kg to local markets

h/: 4000 kgs per ha; Afg 80 per kg

(see Appendix 2 for details of availability and prices of fertilisers and ice)

Both the 0.1 ha ‘domestic’ pond and the 1.0 ha ‘commercial’ pond are projected to show an operating profit, but after deduction of 10% amortization on capital costs and 10% interest on capital plus operating costs (included as an illustration), the ‘domestic’ pond shows a loss. In reality, the labour to construct a ‘domestic’ pond would be likely to be provided by family members and would not be viewed as a capital cost that would incur loan interest or need to be amortized. This would put the ‘domestic’ pond back into profitability in the view of the owners.

Operating profit varies proportionately with pond size: for instance, using the same assumptions as in the table, a 0.4 ha pond would be projected to make an operating profit of Afg 81,596 per year.

Fish is assumed to be sold wholesale at Afg 80 per kg. Direct retail sales at Afg 110 per kg would add a further Afg 120,000 to the bottom line for the 1 ha commercial operator and Afg 12,000 for the 0.1 ha 'domestic' farmer.

For small 'domestic' level producers, fish farming can offer them useful additional income. Ponds of even a few square meters could be developed by the poorer members of the community and if the ponds are built near a reliable water source such as one of the irrigation canals, and the owners are supplied with fry and technical assistance, their pond can offer them a supplementary source of protein and perhaps some additional income through sales to neighbours.

At the larger scale, entrepreneurs who have the funding to develop several hectares of ponds will be able to build their skills in the Small and Medium Enterprise sector and make a valuable contribution to the wider economy.

Land used for pomegranate production generates around Afg 600,000 per ha profit per year, and a change of use to fish production could not be justified. Land used for a standard wheat, corn, onions rotation however generates only around Afg 97,000 per ha. Here fish could offer an interesting alternative, but for preference, there is plenty of uncultivated land available on which fish ponds could be built without creating any conflict with current agricultural production.

6. Project components required

There is widespread interest in starting up fish farming among landowners and businessmen in both Kandahar and Helmand provinces. There are suitable locations to build ponds, market demand, necessary supporting infrastructure, availability of transport and, needed supplies such as fertiliser and ice. Both the central and provincial governments are keen to see fish farming develop. Two main things are lacking: a supply of fish fry and technical expertise. In some cases access to financial credit may also be needed

6.1 Fry supply

Currently, farmers such as the operator in Kunduz bring in fry from Pakistan (at a cost of Afg 1 per piece at origin, Afg 2-3 per piece delivered), but with plans to set up an in-house hatchery as soon as possible. There is also a widespread practice, including in Kandahar and Helmand, of catching small fish from the rivers and stocking them in temporary ponds or irrigation dams for growout, with varying success. Key to the development of a fish farming sector in the two target provinces, however, is the establishment of a hatchery to supply the area with fry and fingerlings.

There is a good location to establish a hatchery at the foot of the Dalah dam, that lies 40 km north-east of Kandahar city. Here there will be a year-round dependable supply of water, and there is already security cover in the area. Below the dam there is land that can be developed to hold broodstock and grow out fry to fingerling size. Water could be supplied via an existing outlet through the dam wall to fill the ponds and filtered for use in the hatchery. There is also the possibility of obtaining water for the hatchery via surface wells, as seepage through the dam leaves the area inundated even in the dry season.



The Dalah dam



Land at the foot of the dam, offering a good location for a fish hatchery

The Dalah dam is well located to supply to farms that could be developed along the Arghandab irrigation canal. The road to the dam from Kandahar city is 40 km long, all but 5.5 km of which is a two lane asphalted road in good condition. This is the road that runs alongside the irrigation canal and so it offers access to a large potential fish farming area within an hour's drive of the dam. The last 5.5 km of the road is stone and dirt, but it is in good condition.

Lashkargar can be reached within 3 hour's drive from Kandahar along a 188 km long road that still includes a 40 km unsealed stone and dirt section, but work is in progress on this and by mid 2006, the whole road from Lashkargar to Kabul via Kandahar is expected to be asphalted. A hatchery at Dalah would thus be well within delivery distance for supplying fry and fingerlings to both provinces. If farms are developed in Helmand in a location such as Marjah, then a sub-unit of the hatchery could be developed near to the water supply from the Bughro canal to hold fry and fingerling stocks. As the Bughro canal is dried out for 3 months per year however, it would be important to keep key broodstock fish at the Dalah dam where there is year-round water available.

Skilled technicians to design and operate the hatchery as well as transfer skills to local staff could be readily recruited in Iran, India, Pakistan or perhaps most usefully, Bangladesh.

6.2 Technology transfer

Technical assistance will be needed by aspiring farmers to help them design and construct ponds, and to teach them how to handle fish, manage the production, and maintain quality through to market.

If ALP/S decides to proceed with promotion of fish farming, then technology transfer and extension work will be important to the success of the project. Technicians recruited for the hatchery will be able to head the training effort and it may be useful that the Principal and staff of Kandahar University have indicated that they are keen to be involved in developing the sector. It may be appropriate to co-ordinate training courses through the University at their newly built facilities (construction of the buildings was funded by the Asian Rural Development Foundation).

A small laboratory for water analysis and disease identification should also be included and equipped.

Current handling of fish for local markets is of a very poor standard. It is desirable that any ALP/S fish farming project also include capacity building in fish handling, use of ice, preservation of the cold chain, hygienic practice, as well as development of the value chain through to market. The demonstration outlet suggested in Section 2.3 above for Kabul would be one component in this potential package.

7. Other

7.1 Stocking the Dalah dam

There exists an additional attractive opportunity to stock fish in the Dalah dam, to take advantage of what appears to be substantial natural productivity there. During the survey, a band of flotsam could be seen paralleling the north shore and piling up against the dam wall. Subject to further investigation, this appeared to be dead phytoplankton (algae) indicating a food source that could be usefully exploited by a fish such as the silver carp. Mixed stocking with a zooplankton eater such as the bighead carp and a selection of bottom and weed feeding carps, could allow good production in the waters behind the dam, perhaps reaching several thousand metric tonnes per year. Fry of species that can be shown not to pose any environmental risks could be produced in the proposed hatchery and stocked into the dam and regular harvesting could be arranged under government control. The mechanism for management of this resource would need to be worked out, but one possibility



Bands of what appear to be dead algae in the Dalah dam – this could be exploited by fish

shown not to pose any environmental risks could be produced in the proposed hatchery and stocked into the dam and regular harvesting could be arranged under government control. The mechanism for management of this resource would need to be worked out, but one possibility

would be for the government to auction the fishing rights to private enterprises. This would bring fish into the market and develop the retail trade sector.

7.2 Ice supplies

There are currently two functional ice plants in Lashkargar with a combined capacity of 112 mt per day. They operate for 6-7 months per year commencing in late March and typically sell about two-thirds of their capacity daily. Prices in 2005 were set by the municipality and were said to be Afg 160 per 72 kg block at one plant and Afg 240 per 70 kg block at the other. There are also additional ice plants out in the districts. One in northern Helmand, 65 km from Lashkargar, has a capacity of 1000 blocks per day (of 70 kg?)

Kandahar is said to have eight functional ice plants and a further two that have closed down. The two plants that were surveyed have daily capacity of 900 and 600 blocks of 80 kg, respectively. One plant owner said he only sold an average of 400 of his 900 blocks per day, at Afg 80 per block, but that at times when competition was stiff, he lowered his price to Afg 20 per block. The other plant owner claimed he sold all of his 600 block production every day at a price of Afg 100-150 per block. The total production capacity of the 8 plants is believed to be in the region of 400-500 mt per day. As in Lashkargar, the plants operate March to September, but one of the owners said he did produce small quantities of ice through the winter to supply hospitals.



Compressors at one of the Lashkargar ice plants

Most of the ice production is shipped out to the surrounding districts and sold under the control of the ice plant owners. It is used principally for production of cold drinks. Some is also sold in Lashkargar and Kandahar towns. Very little is used for food handling or transport. All the ice plants visited use tube-well water and have back-up generators to cover for mains power failures.

There are also said to be three cold stores around Kandahar used for storing fruit and vegetables, but only one may be functional.

Kabul is said to have 15-16 functioning ice plants. One surveyed has a capacity of 1200 blocks per day of 18 kg. They typically sell about two-thirds of their production at Afg 25 per block. The other plants vary in size, but it was not possible to make a supportable estimate of total capacity for the capital.

Overall there appears to be surplus ice available to the markets in the summer but there may be some difficulties in obtaining ice in the winter months.

(see Appendix 2 for detailed minutes)

7.3 Fertiliser supplies

Both Lashkargar and Kandahar have flourishing markets for fertilisers - supplies from Iran, Pakistan and China of urea, DAP, and TSP are readily available.

(see Appendix 2 for detailed minutes)

APPENDICES

Appendices page:

Appendix 1 - Fish Farm Feasibility Study, Afghanistan – Scope of Work 2

Appendix 2 - Minutes of Meetings 3

Appendix 3 - Freight costs, distances & travel time 31

Appendix 4 - Climatic data, Kandahar and Lashkargar 32

Appendix 5 - Population data, Kandahar & Helmand ¹ 33

Appendix 1 - Fish Farm Feasibility Study, Afghanistan – Scope of Work

The Fish Farm Feasibility Study Consultants will be responsible for supporting the implementation of the ALP/South program by performing the following:

- a) Approximate the market demand for fish grown in the provinces of Kandahar and Helmand, Afghanistan including export markets.
- b) Identify those markets, and the distance in kilometers and time (as a function of local roads, border delays, etc.) which could be supplied by fish farms in Kandahar/Helmand.
- c) Identify those species for which markets presently exists or could be developed, which could be profitably supported by Kandahar/Helmand fish farms, including whether they are:
 - a. Local species.
 - b. Non-local species presently found in Kandahar/Helmand waters.
 - c. Non-local species not presently found in Kandahar/Helmand waters.
- d) Determine whether local irrigation and well water are generally appropriate for sustainable fish production of those fish species deemed appropriate for local and export markets.
- e) If local water is not deemed appropriate, identify what mitigating actions would need to be taken to make them suitable, and their impact on farm profitability.
- f) Determine whether there presently exists a fish marketing and shipping network in and around Kandahar/Helmand, including available cold storage, appropriate transportation facilities, retail fish sellers and sales facilities, fish wholesalers (if needed), etc.
- g) If fish marketing and shipping infrastructure do not exist, identify what would be needed, to what extent, and the likely cost of such infrastructure.
- h) Determine the likely profitability of a single stand-alone fish farm in Kandahar/Helmand.

Appendix 2 - Minutes of Meetings

	Appendix page:
1 Mr Halilala Frogh, Asst., Director Aquaculture , MAAF, Kabul.....	4
2 Dr Zenullah Khan Akbar, National Fishery Supervisor, FAO.....	5
3 Ministry of Agriculture, Lashkargar.....	6
4 Irrigation Department, Lashkargar.....	8
5 Dir Agriculture & Dir Irrigation. Kandahar.....	9
6 Fish sellers & restaurants, Lashkargah.....	11
7 Fish sellers & restaurants, Kandahar.....	13
8 Fish markets and restaurants, Kabul.....	16
9 Marjah Village, Helmand.....	18
10 Arghandab Canal & Dalah Dam, Kandahar.....	19
11 Rafor, master fisherman, Lashkargar.....	21
12 Hj Azibullah, fish pond owner, Lashkargar.....	22
13 Hj Mojaddidi, Kunduz fish farmer.....	23
14 Ice plants, Lashkargar.....	24
15 Ice plants, Kandahar.....	26
16 Ice plants, Kabul.....	27
17 Fertiliser market, Lashkargar.....	28
18 Fertiliser market, Kandahar.....	29
19 University, Kandahar.....	30

MINUTE OF MEETING

At : MAAF, Livestock & Husbandry Dept., Kabul

With : 1 Mr Halilala Frogh, Asst., Director Aquaculture , MAAF, Kabul

(mob 070014354) & Mr Wali Muhammed Nuri, Asst to the Dir. Livestock.

Date : 22 January 2006, 1015 hrs

Present: David Currie, Zubairullah

- Wali: there is a park in the south of Kabul where people come to eat fish caught from the river. The fishermen cook them and sell at Afg 400, even Afg 500 per kg.
- Halilala: They are not sure what FAO are doing in aquaculture. Their people came to ask for information but never return to update the Ministry.
- Most of the fish on the market come from Pakistan. Some from rivers, caught for pic-nics. In summer people go to the provinces and eat fish fresh from the river – places like Sayot
- In 1345 (I calculate 38 years ago?), they carried out a survey and found seed from China being stocked.
- There are no data on imports available. It is a very open sector, anyone can import fish, many do and there are no proper records.
- Fish come in from Pakistan only in the winter, not in the hot months as no-one has freezers to keep the fish.
- Policy: the Ministry is keen to encourage fish farming but no NGOs or donors have come forward to help – only for chickens and cattle. They have a master plan for development of the sector but need a hatchery. Local types of fish taken from the river are no good for culture. Bighead, grass, silver and common carp are suitable for culture here but no hatchery.
- In Kandahar, FAO built a hatchery ten years ago but it fell derelict under the Taleban.
- FAO may help them fix the Qargha hatchery via a loan and also providing supplies, feed etc...
- Many Provinces want to develop fish farming, but need technical and financial assistance.
- 10 to 20 years ago, the government had the two farms, Qargha and one in Nangrahar Province. Now there are private farms in several provinces: Baglan, Bamyan, Balx (Mazari Sarif), Kunduz, Faryab, Kapisa. Most catch small mixed fish from the river and stock them in ponds. Some can harvest several tons.
- Data on total area of ponds – none available. The Govt can not offer technical help etc so people have no reason/incentive to register their ponds.
- If we set up something in Kandahar it should be in the city for security reasons.
- Trout: a private farm in Bamyan is operating, but using wild collected seed, no hatchery. Qargha produced 10T trout per year at one time.

MINUTE OF MEETING

At : FAO., Kabul

With : **2 Dr Zenullah Khan Akbar, National Fishery Supervisor, FAO**

Date : 22 January 2006, 1545 hrs

Present: David Currie

- Carp is the thing. They are not keen on the proposal to rebuild the Qargha hatchery, because trout is too expensive for poor people and it will just benefit a few rich folks.
- They have funding approved for a project to build 100 fish ponds of 250 m² in Nangrahar and another 100 in Balx Province. They may do a hatchery also in Mazari Sarif (Balx).
- They have a proposal in process to assist farmers in Kunduz with pond excavation and production supplies costs.
- Nangrahar farmers bring their fry from Pakistan.
- Mojaddidi in Kunduz is setting up a hatchery and has promised them supplies of fry for their 2 x 100 ponds.
- Zenullah has plans to set up three backyard hatcheries in Nangrahar and three more in Kunduz, but needs funding.
- Grass/silver/common carp polyculture is the favoured methodology.
- There are restaurants on the road to Nangrahar that serve fish all year round. They have confided to him though that in the summer, sometimes the fish arrive from Pakistan smelling bad, and they use lots of spices and chilli to hide the fact.
- An NGO in Jalalabad, ARCO, obtained data for him from Customs on the amount of fish entering – in 2004 it was 4000 mt in the 6 month winter period. That is legal imports. There might be another 1000 mt illegal.
- Prices you would get from traders for fish delivered to Kabul are in the range Afg 80-90 per kg. Certainly not less than Afg 80. He has bought very fresh fish willingly at Afg 200 per kg. For good quality you might be able to get Afg 140 wholesale.
- People go to Mahmudraki (Mahmudi?) the capital of Kapisa Province to eat river fish.
- Technology is lacking and there are no hatcheries. These are the problems.

Chickens & feed ingredient issues:

- He is setting up 6 poultry farms in Karayedonishman, Sakardara District to do 20,000 broilers and 6000 layers. This will be Afghanistan's first big poultry operation. Most all chicken comes in from Pakistan, frozen.
- His field of specialisation is in fact poultry. He was a refugee in Pakistan and studied there. His doctoral thesis was in poultry nutrition.
- He plans to establish a small feed mill also. One problem is there is no analytical laboratory for feeds so he will include one in his plan. He reckons he can produce a feed as good as, but cheaper than, the ones imported from Pakistan. The only two ingredients not available are soy and fish meal. But now soy production is increasing in Bamyan and Baglan Provinces and they are exporting to Pakistan, so that could be used here. Also Mojaddidi has said there are lots of small fish in his ditches in the summer and he could collect them and see about making his own fish meal (?)
- Other problem is that there are no day-old producers in Afghanistan. One guy set up in Kabul but he is not doing very well.

MINUTE OF MEETING

At : 3 Ministry of Agriculture, Lashkargar

With : Habiba Rahman, plus 8,

Date : 14 January 2006, 0945 hrs

Present: David Currie, Dr Fazel Elahi

- Helmand people like fish. Given an even-priced choice between chicken and fish, they would choose fish. Less popular in the summer as they are thought to carry parasites. Price is high now – about Afg 100 per kg. People bring straight from the river and sell. Price would be lower for farmed fish because for instance, local yard chicken is Afg 300 per kg while farmed (imported) chicken is Afg 75-85 per kg. Then later he said people would not know the difference between farmed and wild fish, so price could be the same.
- Two main species in the river: Yakoobee, typically 2-5 kg, once he saw one of 30 kg. And Sheermahai, typically 1-2 kg, don't get much bigger than 2 kg.
- Fish are caught in the river by net, sometimes explosives (illegal) and sometimes poison. The nets are encircling type, or gill nets dragged through the water. 15mm mesh (bar). Most fishing is by people who rent nets and go for picnics. They pay Afg 1400 per day to rent a net and might catch 30-40 kg of fish. The nearest thing to a professional is one expert fellow called Rafor who catches maybe 500 kg per day. He goes with about 14 people to work the net.
- Long discussion to try and get an estimate of fish per day landed on the Lashkargar stretch but he says because of explosive and poison use it is very hard to say.
- A lot more fishing goes on in Grishk.
- Some people don't like fishing in winter because the water is so cold. In summer the water is low (point?). For poison they use rat poison (zinc phosphate) mixed with flour and the fish eat it. Or they take bile from cow gall bladder and mix it with a ground seed called *marghay mahrsee* (= 'fish killer') and put that in the water. Sometimes mix snuff with that also.
- No farms around Lashkargar. Some people catch fish from the river and put them in their irrigation dams. There are people who were exiled in Pakistan and learnt some of the methodologies. Often the fish die though, maybe because of disease. Also the fish can not get the food like they can in the rivers. He knew a fellow in Narwa who did this but the fish died.
- The dams are typically 10-30 m² area and maybe 1 – 1.5 m deep. They are filled from a tube well that often runs 24 hours. They open outlets to irrigate the fields depending on need and when the 'sun is shining'. The ponds never actually empty, so fish are OK. The tube wells are 100-120 m deep. The ponds leak when they are first built, but after a while they hold water - and anyway pumping is often continuous.
- Farm growout would have to be between spring and fall. The dams are full then. No point in overwintering fish because it would cost money feeding them but they would not grow.
- River fish are stronger but it might be hard to catch enough small ones. Hatchery fish are weaker and maybe would not survive the fluctuating temperatures in the dams. On the other hand river fish need about 1 year to grow to 1 kg; hatchery fish only need 6 months.
- There needs to be training and feed supply. There should also be a laboratory and health management assistance. Take samples if fish get disease and arrange quarantine/sacrifice etc..

- Community projects are quite possible. People are ready to give their land, say 1 ha needed for a pond. There is a lot of interest in getting into fish farming. And there is plenty of government land. Suggests setting up a demonstration project with generator, tube well and pump, show how to stock and feed, manage water flow. People will copy.
- He trained 2-3 months in Iran. He learnt techniques and returned with more than 30 books on the subject. There were 20 Afghans there, one from each province. Ahmad Ziok was there from Kandahar. Teacher was Abdul Razak Rahimi and the course was at the Mirza Koochackon Institute in Gaylon State. He thinks Abdul Razak is currently assisting a French fish project in Kunduz. He may in fact be an Afghani that moved to Iran. He is very knowledgeable. Abdul Rahman met a Pakistani technical fellow in Kunduz and he was not as good. No problem for Iranians to work here.

MINUTE OF MEETING

At : 4 Irrigation Department, Lashkargar

With : Ing Mohaidin

Date : 16 January 2006, 1035 hrs

Present: David Currie, Dr Fazel Elahi

- There are no big projects planned – too expensive – just rehabilitation being done.
- Thirty years ago there was some work done releasing fish into the drain canals, but it was not high tech or fully organised.
- Data on river flows: there used to be a hydrology department before the Russian period 20 plus years ago, that recorded in several places, but all that has gone now. They do collect daily records of the water depth in the Kajaki reservoir and he has these data. (in fact Fazel has been helping enter them into EXCEL sheets).
- The Kajaki reservoir is 85 km long, average 2 km wide and 70 m deep at the dam. It is the biggest dam in the country. It is 3.5 – 4 hrs by car. There are lots of fish in it and people used to catch them, but the Govt. stopped this. Irrigation department workers occasionally have picnics there and catch some fish. The water can get cloudy in the spring, but generally is clear. You can see a chain 25m deep at the dam. Would cage culture be workable? Answer: why not?
- There are no other large dams in the area, just small ones for field irrigation. In Kandahar there is the Dalah(?) dam however.
- They control the water supply carefully to avoid drought. A few years ago Nimruz district had drought but things are now OK. The system is fairly well regulated.
- Chemical analyses: 20 years ago they used to have a full laboratory, analysing supply and drainage water etc., and soils, but all gone now. The NGO IOM may have done some testing recently as they had a project to add adjusting chemicals to well water. No office here but they have a presence in Kandahar.
- Helmand River water is generally soft – it is run-off from the Boboh mountain and comes from rain and snow. Once it has passed through the soil though, it picks up minerals and is harder. Does it scale kettles? Answer: only a little. (Fazel reports that he has a 120 m tube well at home, and when he uses the water to wash dishes or to wash his car it leaves salt deposits – his neighbours use water from a hand-dug surface well and it does not happen with that). Hard (salty) water is *tahay* in Pashtu.
- Ing Mohaidin suggests a good place to think about farming fish would be in the ‘wasteways’ of the irrigation projects where many drainage channels come together and flow to the river. Marja is one, 35-40 km west of Lashkargar, but not a very safe area; Nad Ali, Naway (Naway I Bara) and Darweshan would be others. There is water all year round in these systems (except for the annual 40 day clean up period happening now, added the AALP/S Ing Habib, when we got back to the office). In the Nad Ali area, the soils hold water pretty well. In the North soils can be more porous. (Problem might be pesticide run off and water quality – supply end of the irrigation areas might be better).

MINUTE OF MEETING

At : Chemonics Office, Kandahar

With : 5 Dir Agriculture & Dir Irrigation. Kandahar

(Mr Aminullah, Director Agriculture & Eng. Sheermahmat, Director Irrigation)

Date : 23 January 2006, 1400 hrs

Present: David Currie, Omer Sharif

Aminullah:

- They have two work plans – spring plan and forward plan, but fish farming is not included in them. There is a livestock project in them but no funding at present.
- They are interested in fish farming though and will support any initiative.
- Five years ago some farmers dug wells and stocked some fish, but not very successful. Now there is water again after the drought years, so more possibilities.
- They have been promoting chicken production but now with fears of Asian Bird ‘Flu’ a change to fish would be a good thing.
- People will readily give up land to build a pond.
- Comparative profitability – their estimates:
On good agricultural land, farmers run three crops. Wheat - which gives them an income of Afg 30,000 per ha after seed, fertiliser, pesticide costs etc deducted, then corn in the hot season which gives them Afg 7500 (this crop is also important to them for animal feed) and then eg onions which gives them an income after costs of Afg 60,000 per ha. So total Afg 97500 per ha. If they used the land for chicken farming it would give an income of maybe twice that. Grapes would be more profitable if there was a decent export market because Kandahar grape quality is famous. As are its pomegranates. But they only sell on the local market at low prices so the wheat/corn/onions cycle is currently better. Poppy is a replacement for the wheat crop and gives a profit of Afg 700,000 per ha.

Group:

- There are three cold stores around Kandahar for fruit and vegetables. May be only one working at the moment.
- Are there areas of bad soils or is the only key thing water? There may be some areas of poor soils with water. There are certainly areas of good soils without water. But some landowners have land they don't cultivate (for instance in the Daman District) so there is plenty for conversion to fish. Owners want to operate with tube wells.
- The Kajaki dam water and the Boghru canal do not pass this area – but ALP/S had a plan for building a 140 km canal from the Kajaki dam to this area to irrigate the Zhari and Maywand Districts. Estimate 7 years of digging. As far as Omer Sharif knows there was no sign of funding yet. The Kajaki has plenty of water for Helmand and Kandahar.
- There are three main rivers: the Argandab, which has water all year, but sometimes more, sometimes less; and the Tarnak and Argistan which have minimal flow some months. These are tributaries of the Helmand. The Argandab provides 80% of the irrigation for the Province.
- The Dalah dam was built in 1952 by the USA and is 520 m long, max 270 m wide and should have 45 m water depth at the dam. The dam is 50 m high. However it has silted up and there is currently only 25 m of water (and 20 m silt). Omer Sharif comments it was cleaned out twice during the king's time and following regime. Not since. It has water all year.

- The Dam used to have lot of fish, but poor management under the Taliban drained it. Many fish must have died as there were complaints of the smell. Now the fish are coming back. Anyone can fish there so stocking or cage culture might not work. In full production it could probably supply all the fish needed in the city.
- There is another small reservoir, Pilco that is used for hydro-electricity. It has water 9 months of the year and is dry 3 months (for maintenance?). But the dry months are Dec-Feb and there is water again in March (so might have possibilities).
- Local fish consumption. Sounds different from Lashkargar. Fish is considered to be expensive at Afg 100 per kg and there is not much available so people are not so accustomed to eating it. There are Sheermahi, Yakobei and others. Yakobei - one type came from eggs imported from the USA. All the supply comes from the rivers.
- Chicken costs Afg 75 per kg., sheep Afg 200/kg, beef Afg 130/kg, goat Afg 180/kg.
- If fish were the same price as chicken, demand would rise, but given an equal priced choice between fish and chicken, most people would probably choose chicken. They are not used to fish.
- There are some very poor people in Kandahar but the 'average' person in Kandahar probably eats meat protein 2 or 3 times per week. Unlikely one of those on average would be fish even if it was the same prices as chicken. But agree 10% of the people eating fish once a week is conservative and 30% not impossible.

MINUTE OF MEETING

At : 6 Fish sellers & restaurants, Lashkargah

With : see below

Date : 16 January 2006, 0950 hrs

Present: David Currie, Dr Fazel Elahi

Qaderi Restaurant, New Market area

With : manager

- Customers often ask for fish, but they do not offer it, as it is usually a bit expensive and at this restaurant they offer meals for Afg 50.
- They find it hard to say what they would pay for fish as they can not estimate how much 'meat' they would get per kg. But given say a piece of fish 'meat' and a similar boneless piece of animal 'meat', they would pay the same as for sheep (which is more than they would pay for goat or beef), as people like fish.

Fish shop, Lagaray Mosque area

With : Abdullah, manager

- In business many years but three months ago set up this shop.
- His relatives have a truck and they collect fish about 1 day's drive upriver at Bernarderr in Garmser district. They put fish live in two tanks they have on a truck and then drive to Lashkargah. Sometimes they sell to people along the way.
- Typically his relatives handle about 450 kg/day and bring 80-100 kg to Lashkargah. Today though they only brought 20 kg because the roads are muddy, which makes their transport more difficult and means fewer customers will come into town.
- Today he has Sheemahei (photo'). These are normally about 2-3 kg size but can reach 10 kg. Tomorrow he may have different species. He mainly handles Sheemahei, Yakobee (which they also call Aseel) and Patreye (slang name meaning something like 'hand' or 'rocket'). Patraye can get up to 9 kg. He once caught a 45 kg Yakobee. They can grow in ponds at 1-2 kg per month.
- He also has some ponds in Naway (Naway I Bara) district. It is about 1.5 hours by car. He has 4 ponds each 20 m x 15 m x 1.5 m deep. They are dug into the earth. Last year they made one pond and then have increased to four. Some kind of brick wall around them also. In one pond they had reared nearly 1500 kg of fish but someone maybe poisoned them.
- They have flow through water – from an irrigation canal – when the level in the canal gets low, they use a pump. They feed some bread and raisins.
- The stock was by collecting large fish from the river and letting them breed in the ponds.
- He does not buy fish from the Lashkargah stretch of the river.
- The price in the market is variable. Today he is selling at Afg500/man (=US\$2.22/kg). His selling season starts in the month of Mezon (23Sep-22Oct 2005) and ends in late Hamal (approx. 21Mar–20 Apr 2006). At start of the season, the price was about Afg300/man, it won't go much above Afg500 until early Hamal and then will fall again as the temperatures rise.
- If people ask his collectors for fish on the riverbank they don't sell for less than Afg500.
- If he harvested 1500 kgs what would he do? Answer: he couldn't sell it all in Lashkargah – maybe 270 kg here, the rest maybe send to Kandahar or Kabul.

- Traders from Kabul and Kandahar often come through, looking for fish. Price would depend on them and their calculation of what their market would offer and their transport costs etc..

Roadside fried fish stall, Karimbye chawk district

With : operator

- Fries up about 45 kg per day of 20 cm long Sheermahei and sells at Afg 50 for about 5-6 fish (less than 1 lb fresh, I would guess).
- For a more precise calculation: he also fries for people and charges Afg90 per kg fresh plus Afg20 per kg to fry them.

Butcher

- Beef Afg124-130/kg
- Goat Afg170/kg
- Sheep Afg160-170/kg
- Chicken (frozen) Afg75-80/kg

(yet the restaurant had said sheep is more expensive than goat – Fazel comments that sheep is more expensive now in the cold season as it is considered more ‘warming’).

Fazel had estimated Beef Afg130/kg with bone, Afg160/kg without bone.

MINUTE OF MEETING

At : 7 Fish sellers & restaurants, Kandahar

With : see below

Date : 24 January 2006, 1025-1230 hrs

Present: David Currie, Mr Raz Muhammad Nizami

Fish fryer and seller, Mr Wali Mohammed, Kalapasil, Herat Gate area (photo')

- His fish come from Lashkargar, brought by a trader.
- He buys around 90 kg per day during the winter months.
- He pays Afg 160-200 per *man* (Afg 36-44 per kg) for small (20 cm) Sheermahi (6 anal fin rays). Quality is poor.
- He sells fried fish at Afg 150 per kg.

Fish fryer and seller, Mr Mohammed Hassan, Kalapasil, Herat Gate area

- His fish come from Grishk, brought by a trader.
- He buys around 10-20 *man* (45-90 kg) per day during the winter months.
- He pays Afg 200-220 per *man* (Afg 44-49 per kg) for small & medium (20-30 cm) Sheermahi (6 anal fin rays). Quality is poor.
- Sheermahi is the only fish he sells. He doesn't use fish from Pakistan because it smells bad.
- He sells fried fish at Afg 300 per *man* (Afg 67 per kg).

Fish fryer and seller, Mr Malang (son of the owner), Topkana area

- His fish come from Darla Dam & Wayan, brought by a trader.
- He buys around 20-25 *man* (90-112 kg) per day during the winter months. Handles small quantities in the summer also.
- He pays Afg 180 per *man* (Afg 40 per kg) for small (20 cm) Sheermahi (6 anal fin rays) and Afg 250 per *man* (Afg 55 per kg) for big ones (look about 750 g). Most people prefer the small fish. Quality is dire (photo's of the larger fish and the gutters of the small fish).
- There are three other shops like his in this street.

Fish fryer and seller, Mr Zmaray Topkana area (across the street from Malang)

- His fish come from Kajaki Dam, brought by a trader.
- He buys around 15-20 *man* (67-90 kg) per day during the winter months for frying and another 50 *man* (225 kg) per day to sell fresh. Has a bin and two sacks full of mainly small Sheermahi but also a few small Yakobai carp.
- He 'sometimes' pays Afg 100 per *man* (Afg 22 per kg) for the small (20 cm) Sheermahi. Quality is poor.
- There is only one other shop like his selling fresh in this street.

Raz Muhammad estimates:

- There are maybe 30 areas like this in Kandahar doing around 100 *man* (450 kg per day) in the winter months.
- Raz eats fish once or twice a month but buys US tuna from a store (see following). This kind of 'supermarket' is a new development in Kandahar.

Aria Co Ltd 'Supermarket'

- Frozen chunk tuna, Raz buys – Afg 120 for 1.22 kg (sell by date: Oct 2007). This is cheaper and better than canned tuna which sells at about Afg 65 for a standard tin.
- They also send the chunk tuna to Lashkargar and Kajaki, where fresh fish comes from! How much do they sell? Not clear yet as they have just started bringing it from Kabul. But they sell 50-60 cartons of 48 tuna cans per month.
- Would they buy farmed fish? Yes, but they would like it filleted and packaged. This would be to sell to foreigners. Local villagers prefer to buy whole fish.

Mirwais Hotel & Restaurant, in the main street – owner & his son

- They do not offer fish on their menu but they would be interested if it was good quality and filleted.
- They offer meals at Afg 65 so it would have to fit into that. They would not pay as much as for sheep but maybe as much as for beef, Afg 80-100 per kg, meat for meat. They would pay more than for chicken because people like fish.
- They could maybe use 200-300 kg fish fillet per month. At the moment they sell mostly sheep, some chicken, some beef.

Abdali Food Point Restaurant, Town Centre, Raz Mohammad 'Naseem', owner

- Raz comments he is one of the types who have been abroad and now introduce new ideas, like this more stylish (comparatively) restaurant. He was a useful informant. Seems to know the economics of his business.
- No fish on the menu at present. He would be interested though as it is easy to cook, people like it and he can do it five different ways.
- He doesn't buy now because the supply is not regular. What about a deal with a trader from Kajaki or Grishk? Not reliable. His is a 'fast food' type fixed item restaurant and he needs reliable supply. What about from Pakistan? The town across the nearest border is Kawata and there is no fish there. It would have to come from Karachi and that is not workable.
- In Kabul there is a lot of support to get a restaurant going – people will supply freezers, premises, finance. Here you are on your own.
- If fish was offered he would prefer it filleted. Hard to estimate what quantity but as a guide he uses 25 kg beef, 15 kg sheep and 60 kg chicken per day. Maybe 20-25 kg per day of fish? If the price was similar to chicken maybe 50 kg/day because people prefer fish. It is good, because he can cook 5 different dishes with fish.
- Price is important. For instance before the imports of frozen chicken, chicken was around Afg 200-250 per kg and very few people could eat it. Now it is at Afg 70-80 everyone eats it a lot.

- There are maybe 100 restaurants altogether in Kandahar. Only a few like his.
- If fish were cheap, it would not just be the restaurants using it, but other people would start to set up fry shops.

Raz comments:

- 1 kg of sheep with bone is typically used to make a stew and will feed 8-10 people. But 1 kg of fish will not feed 8-10 people and that is a key point. People are not interested in soup of fish so it is the 'meat to meat' comparison that matters.
- Probably some of the interviewees are understating the price and Afg 100 per kg is more realistic. But they are not going to pay the same price as sheep, because of the number of people that 1 kg of each will feed.
- If the price were right he reckons 60% of the population of Kandahar would eat fish once a week (I had floated 10%). When the price is high like now, many people want to eat it but can not afford it.

Butcher

- Beef Afg 120 with bone, Afg 140 without (cf Afg124-130/kg with bone in Lashkargar, Afg 160-170 without in Kabul)
- Sheep Afg 200 with bone (not sold without). In the Govt. shops where the traders don't pay rent etc., it sells for Afg 170/kg but quantity is limited and all is sold by 10 am. (cf Afg160-170/kg with bone, in Lashkargar, Afg 210/kg in Kabul).
- Chicken (frozen) Afg 70/kg (cf Afg75-80/kg in Lashkargar, Afg 90/kg in Kabul). Raz advises this is US chicken coming via Dubai.

MINUTE OF MEETING

At : 8 Fish markets and restaurants, Kabul

With : owners/managers

Date : 20 January 2006, 0800-1400 hrs and 21 January 2006, 1130-1400 hrs

Present: David Currie, Zubairullah

- Zubairullah informs Kabul prices for:
 - beef: Afg 160-170 per kg without bone
 - sheep: Afg 210 per kg with bone
 - chicken: Afg 90 per kg (frozen)
- **20 Jan - 0830hrs - New City Road (Shahranow St) Fish stall owner Mr Sharpur:**
His fish comes from Jalalabad brought to him by a trader. He sells about 35 kg per day only in the cold months. He sells ice cream in the summer. Fish varies but today he has about 45% silver carp ('silva'), 50% a fish with a long ventral fin (see photo's) ('moyeelakah' – probably a Wallago or Callichrous catfish), and a few grass carp ('sagorah') of about 1 lb size. He has these every day but some other fish like 'china' only occasionally. He sells at Afg 160 per kg for large, Afg 140 per kg for small.
- Next stall along, the fellow sells 45-70 kg per day at Afg 160 per kg. He buys at Afg 80 per kg (he told us without hesitation). A trader supplies him.
- Next stall – he sells 50-100 kg per day. It comes from Pakistan. A trader supplies him.
- Across the street – Mr Ainadeen in front of the Argee Rhamatalay Charkolee Restaurant, Park St.: sells 50-75 kg per day, at Afg 120 per kg, buys at Afg 80.
- Fish has obviously been frozen at least overnight and appears to come to Kabul, all together, organised by a particular trader and then it is split around the stalls. Quality pretty poor.
- Zubairullah says there are 12 or 15 stalls like this along New City Rd. Businessmen and richer people come to buy here where the quality is better, but the price is higher. There could be 10 or so other areas of the city where there are similar numbers of stalls but where the quality and price is lower.
- **20 Jan - 1100 hrs Popo 'Lano Italian Restaurant, Insaf Hotel Rd**
Seafood section of the menu includes salmon, shrimp, spaghetti, scampi, and 2 dishes of fish fillets out of the total of about 10. They serve about 5-10 seafood orders per day. They don't buy fish from the local market, only imports. Seems quite small demand.
- **20 Jan - 1115 hrs L'atmosphere (French) Restaurant. M Marc, Manager.**
Serve flounder they buy bulk frozen from 'Blue' supermarket. Have to buy too large a quantity. Buy at 'Supreme' supermarket also. They serve about 10 fish plates a day, say 250 per month. Interested certainly in good quality local fish. Are carp good? He's never tried them.
- **20 Jan - 1200 hrs Samarqand Restaurant, Davakhona Rd.**
Chef out but Manager confirms they have sturgeon and pike-perch on the menu but have difficulty getting supplies. Talk to chef tomorrow.
- **20 Jan - 1245 hrs Kabul Serena Hotel**
Very smart new hotel but no fish on the restaurant menu
- **20 Jan - 'Blue' supermarket:** One of the two main expatriate outlets. Not much fish and all imported.
 - 400g skinless cod fillet – US\$16.30
 - 800g skinless hake fillet – US\$20.52
 - 400g whole trout (France) – US\$7.54

- **20 Jan - 'Supreme' supermarket:** The other of the two main expatriate outlets. Not much fish and all imported.
 - Nile perch fillet – US\$12.00 per kg
 - cod fillet – US\$15.80 per kg
 - haddock fillet – US\$13.40 per kg
 - 500g Rainbow trout – US\$7.00
- **21 Jan – 1130 hrs, Intercontinental Hotel**
GM Laila Salari-Mercier (Iranian), Food & Beverage Mgr (who?) & Ahmad Haris Nayab, Asst Banquet Mgr
 - They don't buy fish in New City Rd because they can not be sure of hygiene. In contrast beef and lamb they buy a whole carcass the day after slaughter and butcher it themselves.
 - Also there are too many bones. They really want fillet ready to use. If that could be offered with good quality they would certainly be interested. They do offer some fish that they buy as fillets at 'Supreme' or 'Blue' but it is very expensive.
 - About 50% of their customers are foreigners and 50% locals. The foreigners in particular often ask for fish. They serve about 50-60 covers per day for lunch in their main restaurant and 80 per day for dinner. These are both buffets. This is the slow season and those numbers double in the summer. September to December is the peak season. If there were good fillet they would offer it at these buffets. They estimate if fish was on offer, 50% of the customers would choose it. GM would have to talk to the chef about actual kgs required. They serve about 20 covers a day at their *a la carte* restaurant. That is not doing too well, but the buffet is.
 - If they only served alcohol, business would boom (!)
 - They could also offer fish for parties and banquets (banquet manager had said no-one ever asks for it). And at the outdoor BBQs they have in the summer.
 - The other big hotels are the Serena and the Safilan Mark – both new. The Intercon was built in 1969 (opened by the king).
- **Banqueting Mgr says he likes fish and buys it in New City Rd.** Price? Afg 100 per kg.
- **21 Jan – 1345 hrs Mr Hamid, fish stall, Daykhonan St**
This is the area of the 'cheaper' fish stalls.
He sells fish in the winter and ice-cream in the summer.
Catfish from Kunduz Afg 140 per kg. Silver carp from Jalalabad (Serbee area) Afg 120.
It all looks the same stock though as we saw in New City Rd yesterday.
Sells 20-40 kg per day. Then later, when we said we wanted to find a market for fish from a farm, he said he had only said 20-40 kg because he thought we were customers; actually he sells 100 kg per day. He would pay us Afg 80 per kg delivered, and it would be good if we sell all to him and he will arrange distribution to other stalls.
- **Next shop: Mr Amanaden.**
Sells 40-60 kg per day. Same species mix. Sells at Afg 80 for smalls, Afg 120 for large. Would buy from us at Afg 50 per kg.
- **Zubair notes** that there are only these two stalls here now. There used to be many all along this row of shops when the price of fish was Afg 80 per kg. Now it has risen in price so the demand has fallen.

MINUTE OF MEETING

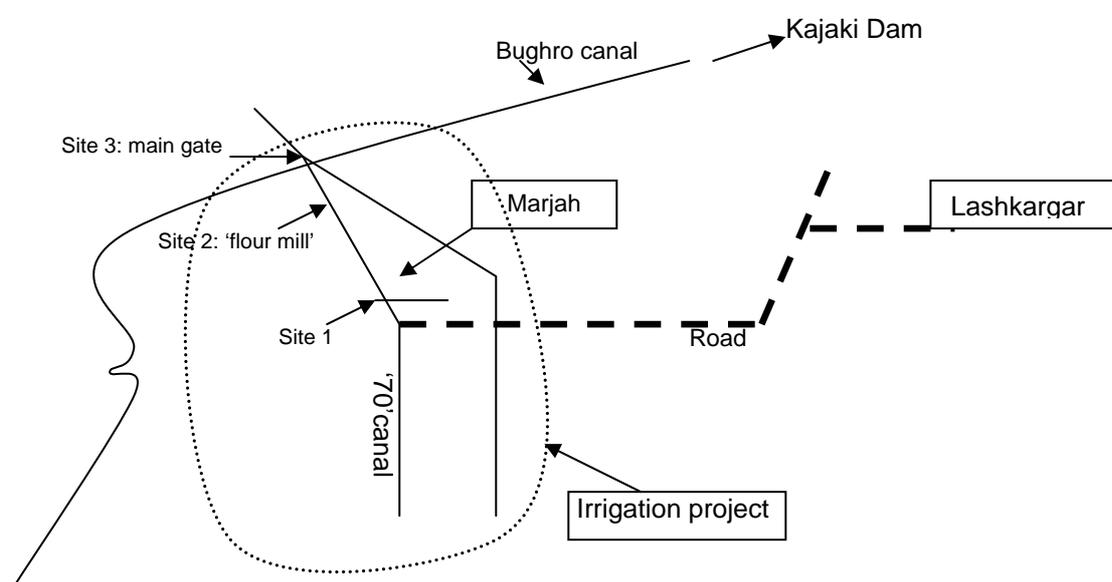
At : 9 Marjah Village, Helmand

With : Visit to irrigation system

Date : 17 January 2006, 0900 – 1430 hrs

Present: David Currie, Dr Fazel Elahi, Ing Habibullah

- About 1h20m drive from Lashkargar centre. Unsealed roads but OK even after the rain.
- Interesting location where the Bughro canal comes through (it brings water all the way from the Kajaki Dam, divides into two branches above Lashkargar and this is the branch feeding the large irrigated agriculture project south of Marja. The project was built by the USA in the 60s/70s in the time of the king and was formerly wasteland. People were translocated from all areas of Afghanistan to settle the area. Mixed cultures.



- Site 1: where one of the side canals branches off and the first place we stopped (and photographed). Water is not numbingly cold. I would guess 8-10 °C. Clean with a little milkiness. Running well but they say it does not always have water.
- Site 2: the 'flour mill' (*auweezherandi*): here there is a 3 m drop down to the next section of canal, which then runs through a big flat farming area. The lower section of canal is about 1 m below the land elevation of that farming area. Neat opportunity to take water from above, pass it through ponds and hatcheries built on top of the ground elevation and drain back into the supply canal which then continues on to the irrigation branches. No pumping and no net usage of water. (Ray comments that it would be better to go from ponds to fields as if the pond effluent goes back into the supply canal, an EIA would be needed).
- Site 3 is 3-400 m further up and is where the '70' canal (*aftod*) branches off the Bughro. Here again there is a 2-3m drop.
- There is water in the Bughro canal all year except for a few days cleaning.
- The locals say they catch sheermahi in the Bughro, up to 4 kg size, but not so many.
- Wheat yield in this area is 1.5–2 *karwa* (1 *karwa* = 450 kg) per *jerib* (1 *jerib* = 2000 m²), So about 3.4 - 4.5 mt/ha. They sell it at PakRp55-60 per *man*. (=US\$208-227/mt).

MINUTE OF MEETING

At : 10 Arghandab Canal & Dalah Dam, Kandahar

With : Mr Rojamanan, local landowner

Date : 25 January 2006, 0830-1200 hrs

Present: David Currie, Omer Sharif

- The Arghandab canal runs from the Arghandab River, 25 km, to the outskirts of Kandahar, at Pilco. There is an asphalted two lane road alongside it all the way. It is dry now for maintenance but it is full 9 months of the year starting around 20 March. I estimated it is 20-25 m shoulder to shoulder, 6 m toe to toe, about 4 m high and carries maybe 2 m depth of water.
- Along most of its length there is housing, also numerous adobe compound walls with no house inside them, built on the Government land to the East. Also open areas of rocky ground with no apparent agriculture. This side slopes up away to the mountains. To the West of the road and canal are houses, cemeteries and extensive irrigated farmlands including pomegranates, mulberries and vines. Most of this land is a couple of meters below the road and canal, and slopes down and away. Good opportunities here for people to build ponds taking the irrigation water before it goes to the farmland, or even domestic ponds inside the adobe enclosures – all could be filled by gravity. Omer Sharif is certain the soils here hold water well.
- There are 7 small gated outlets from the canal along its length to feed farming areas and quite a few full width control gates along the length.
- About 20 km from the outskirts of Kandahar is the intake to this canal from the Arghandab river. This is near ‘Intake Bridge’ (photo’s) at the village of Suznai. The river would have to be pretty deep and wide to fill the canal to 2m depth, the water mark on the gate, and I suspect it may be deep enough in spring and early summer, but it seems unlikely there would be enough water coming down from the mountains in late summer and fall. Still be some flow maybe.
- About 32 km from Kandahar outskirts we turned off the asphalt onto a stone road and 3 km later there is a bridge over the dam spillway. Another 2 km is the camp for dam security and a park that people come to for picnics. There is surface water in the low parts of the road along the foot of the dam, presumably from underground seepage so a shallow well could be a useful source for a hatchery here.
- The reservoir is a lot more than the 500 m x 200 mentioned by the Dir Irrigation. I estimated 500 m wide at the dam and maybe a couple of miles long into the distance. From the air navigation map, the lake shown looks about 6 miles long x 2 miles at its widest. However a Google Earth satellite image measures up at about 1 mile x 0.5 miles. The spillway comes off some way from the dam on the north side of the reservoir and a mile or so along. The water is milky green and there was a long band of spindrift that looked like dead algae along the north shore as well as piled up against the dam wall. The water was 8-10 m below max.
- There are said to be Shermahi and some Yakobei in the reservoir – asked about silver carp, Rojamanan commented that as far as he knew only the two species were there. Could have been others put in by the US but all died when the Taliban drained the reservoir. Well worth stocking with mixed species.
- The foot of the dam would be a good place for a hatchery. Security is there and it is only 5.5 km to the asphalt (took us 13 minutes on decent stone road) then 13.5 km more to

the start of the canal (another 12 minutes drive). From there farmers could be supplied all along the canal route, a further 20 km.

- At the Kandahar end of the canal, after the water passes through a tunnel, at Pilco, there is a complex of gates and pools right alongside the airbase perimeter fence. There is no land really on the airbase side and there are houses on the right bank so although security would be good there, there is not much land available. In any case the Dam would offer 12 month water, Pilco only 9.
- Rojamanan owns about 66 jerib of land in numerous separate parcels.
- On the route back along the canal we visited a farm at Old Mazra Village. Property of Mohammed Wali. A concrete tank about 16 m x 16 m x maybe 1.80 m deep was built with Japanese aid in 2004. It has an 80 cm thick wall said to be solid concrete and was built as a reservoir. OS advises it was a scam and will serve as a swimming pool. There is another one just like it at another farm. The land alongside is vines and there is then a drop of 1 m to a path and another 2 m to a pomegranate plantation. This is probably typical of the topography here west of the road.
- Pomegranate economics: 90 trees per jerib produce 1200 *man* per jerib. Sell at Afg 100 per *man*. Costs are 1 kg DAP and 1 kg Urea, plus 1 barrow animal manure per tree per year. Almost as good a business as poppies. (OS notes poppy prices fell this year from Afg 85,000 per *man* to Afg 39,000 per *man* and the Agric Director's calculation of Afg 700,000 profit per ha (see other minute) was based on the new lower price.

MINUTE OF MEETING

At : AALP/S office, Lashkargar

With : **11 Rafor, master fisherman, Lashkargar**

Date : 16 January 2006, 1400 hrs

Present: David Currie, Dr Fazel Elahi

- He has been fishing 35 years.
- The common fish are as follows:
 - Golai (reaches 12-15 cm maximum)
 - Songlaiz (reach about 2 kg)
 - Sheermahei (reach about 2 kg)
 - Charkhee (reach less than 0.5 kg)
 - Yakobai (2 different kinds) (one reaches more than 30 kg, the other about 1.5 kg)
 - Turandye (reach 25-30 kg)
 - 'chinese' fish (reach 40-50 kg)

He believes the last three were introduced into the Iran stretch of the Helmand under the Rafsanjani administration using eggs/fry from Russia (Yakobee and Turandye) and China ('chinese' fish) and they have now established breeding populations. The 'chinese' fish doesn't take to ponds – only in the river. It is white with a big head.

- He uses two kinds of nets. One is 100 m long and 8 m deep with a mesh size of 15-20 mm (bar). The other is an encircling net that finishes up about 4 m diameter.
- A few years ago used to catch 600-700 kgs in a day but now fish are less. There were some years of drought that maybe affected the fish. Now he sees many fry so perhaps the stocks are returning. Used to catch fish in the Lashkargah stretch but now goes mainly near Naway and near Grishk.
- In this 20 day season of very cold weather (has a Pashtu name) the fish hide in their holes and can not be caught, or they go to drainage water where it is 'warmer'.
- His catch is up and down. The day before yesterday he caught 45 kgs in 3 hours, but ate most at a picnic. These were Charkhee – only small, 0.5 kg or less. Sometimes rich people will pay him Afg2000 to go and help them catch fish for their picnic.
- Price he gets now when he sells is around Afg300/*man* (=US\$1.33/kg) We discussed the various prices we have been hearing. He says he has never got more than Afg350/*man* (=US\$1.56/kg) for his fish.
- Sun, moon and day/night affect the fishing. Generally the fish go towards the side of the river where the moon or the sun is. Many people fish one side of the river in the morning and the other side in the afternoon. If they see the shadow of a person, the fish flee.
- Do people take the small ones and put them in ponds? Answer: the small ones they generally return to the river.
- Kabul people who come down for picnics comment how different his fish taste, as what they get in Kabul is often many days old.

MINUTE OF MEETING

At : AALP/S office, Lashkargar

With : 12 Hj Azibullah, fish pond owner, Lashkargar

Date : 15 January 2006, 1040 hrs

Present: David Currie, Mark LaGrange, Ray Baum, Ing Said Akhbar

- Ray and Mark had been talking to Hj Azibullah about a corn oil extraction plant he is buying from Switzerland. He also has a fish pond on his farm in N.Helmand:
- It was built 1 year ago under advice from a visiting Iranian fellow. It is 60 m x 50 m x 2m deep and is built above ground with two brick walls interfilled with earth and with a concrete bottom. After some discussion he decided it cost him PakRp 3 mio or US\$51,000.
- It was never stocked – they had a plan to catch small fish from the river, but could not get enough and they are not sure of the technology. The Iranian fellow did not follow up with any technical support. It is now being used to irrigate pistachio trees.
- Water supply is from a tube well and there is water all year round. The tank does not leak. It has two steel 4 inch gate valves to empty it. The tube well runs on mains electricity. He installed the line to the village and the previous Governor was supposed to refund him, but never did.
- With a 4 inch pump it took about 48 hours to fill using the tube well.
- The farm is 65 km north of Lashkargah in Musa Qala district. He also grows grass, corn, wheat and has some cows and sheep.
- He has an ice factory there also with capacity for 1000 blocks per day (probably of 70 kg).
- He also built a hospital for the community and brought in doctors from Kabul.
- Has been ripped off by the Pakistan agent he was using to buy the corn oil plant to the tune of maybe US\$100,000. Now dealing through the Swiss Embassy.

MINUTE OF MEETING

At : Chemonics Office, Kabul

With : 13 Hj Mojaddidi, Kunduz fish farmer

Date : 27 January 2006, 1700 hrs

Present: David Currie, Zubairullah

- He has 10 ponds in Aina Al Majar Village, Ulusuwally Chordala District, Kunduz, five old and 5 newly built. Total 3 ha. The largest is more than 1 ha, most are about 0.4 ha.
- He is growing silver and common carp (and rohu?) that reached 1-3 kg in one and a half years. He caught fish from the river in 2003 and sold them in 2004. Then he bought 10,000 fry from Pakistan assisted by Ken Neils. Afg 1 per piece there for 1-2 inch, Afg 2 or 3 by the time they reached Kunduz.
- He wanted to give up fish farming but Ken wouldn't let him (!)
- He can sell 400 kgs easily per day in the 7 districts of Kunduz. Catfish gets the best price, Afg 180-250 per kg. Grass & silver carp, rohu and mrigala, all Afg 130-150 per kg..
- He came down to Helmand to set up some 50:50 joint ventures but they fell through because of the security problems. He looked at two locations, one in a poppy area. He talked to Mercy Corps down there and suggested they send some people up to Kunduz for training, instead. They said they could not assist.
- Mercy Corps is going to fund an expansion in Kunduz. They will provide 40% of the construction cost, he will provide 30% and the land owner the remaining 30%. They have a list of 71 applicants all registered for the program (showed me the list). There are 28 so far (?)
- Next year Mercy Corps are planning to assist him 50:50 with construction of a hatchery. His plan is to make a big hatchery that could supply the whole country. Afghanistan needs this kind of development. Problem was nowhere to keep the brood fish.
- Kandahar and Helmand people like fish. He estimates you could readily sell 1000 kgs a day there.

MINUTE OF MEETING

At : 14 Ice plants, Lashkargar

With : see below

Date : 14 January 2006

Present: David Currie, Dr Fazel Elahi

Hj Abdul Wahid's ice factory, Safian area (about 1 km out of the centre of town).

With : Mr Sherim, mechanic and i/c plant.

- In operation for 12 years.
- Two units:
First with 2 Pakistani JAWED 6x6 compressors each 75 Hp plus one Pakistani Mughal compressor about the same size. Also a spare JAWED lying outside in good working order. All ammonia.
Second unit that they built about 2 years ago. Has 3 Pakistani PPCO and 2 JAWED compressors, all about similar size to the others. All ammonia.
- He considers the PPCOs better than the JAWEDs.
- Total capacity is about 1000 blocks per day of 16 *man* weight (1 *man* = 4.5 kg, so equal to 72 kg), but they only run at about 350 blocks per day (probably just running the first unit). Could volume up if the demand was there.
- They start production around end of March and operate 6-7 months.
- They don't sell all 350 blocks every day but certainly sell more than half on any day.
- Last year sold at Afg 160 per block. Price is set by the Municipality.
- Main problem is reliability of mains electricity so they have a Cummins 350 KVA genset.
- Most of their production goes out to the surrounding districts. People there don't have electricity, so they use ice mainly for cooling drinks. Not really for food transport or anything. They sell some around the town to shops and bazaars, but that is minor. They have agents for each district and these agents operate under the control of the company.

Mr Hamoyun's ice factory, Kalakarhana area (central near the bazaar)

With : Mr Mahmoud Rahim – guard

- In operation more than 40 years but started small and have expanded steadily.
- 8 ammonia compressors – 5 Noor Ahmed Manzoor Ahmed & brothers, 1 JAWED 5x5, 1 JAWED 6½x6½, 1 FREEZE. Look about the same size as the other factory's. Another u/s JAWED 6½x6½ outside.
- Three block freezing units in 2 buildings.
- Total capacity is 600-650 blocks per day, each of 70 kg. They reach that in the hottest months and match production otherwise to demand.
- They too start production around end of March and operate 6-7 months.
- Last year sold at Afg 240 per block. Price is set by the Municipality. Discussion about why this was more than the other place. He said it is because the other factory is a bit out of town and has to lower their price below the Municipality's limit. But 1/3 less? Must be more to the story.
- They have two gensets, a Rolls Royce 200 KVA and a Russian KROS 100 KVA powered by what looks like a truck engine.

- Most of their production too goes to the surrounding districts through agents. They pay them commission, as if they sold to them to operate on their own behalf they would charge too much and reduce throughput (could be valid?).
- They don't have any cold store because they operate 24 hours per day on two shifts and ice comes straight out of the tanks and out the door. Locals come and take away 1 or 2 blocks on bicycles or in wheelbarrows. The shipment to the districts they send in trucks without insulation, just a tarpaulin they have from some NGO put on top. They leave at about 2 am and arrive by 6 am so losses are manageable.

Third ice factory, now closed

We passed the location of a third ice plant, but it has been closed about ten years and the property is now a residence. Not known if any equipment is still there. The original owner/operators left.

MINUTE OF MEETING

At : 15 Ice plants, Kandahar

With : see below

Date : 24 January 2006

Present: David Currie, Omer Sharif

Horasan Co ice factory

With: Abdul Matim, Director & Owner, plus colleague

- Capacity is 900 blocks of 80 kg per day. Sells about 400 per day on average, never sells all. Operate summer only but later he said they can easily run 12 months and do produce just 10 or 12 blocks per day for eg hospitals in winter (but seems shut down right now).
- Price is 'often' Afg 80 per block. If competition is stiff he sells as low as Afg 20 per block.
- There are 8 plants in operation in Kandahar, plus two shut down with broken equipment. Hj Abdul Wahid is the biggest operator with two plants, each of 900 blocks (see below), this guy is second. In total he estimates Kandahar capacity is 4000 blocks per day. Hj Abdul Wahid also has plants in Lashkargar and Grishk.
- Most goes to the districts. Some to the town. They arrange trucks to the districts and retain control of the sales. Used for drinks. They send also to Malankah(?) in Helmand.
- Four compressors in one room, all 75 Hp, One Manzoor Ahmad, two Javels, one anon. Two compressors in the other room, both 50 Hp Freeze. Manzoor is the best. All NH₃
- New Genset – Dorman 600 KVA (looks refurbished).
- Water is from a 100 m tube well. Bottom 20 m are filter. Water table is at 3 m.
- He is building a 600 m² fish pond in Jeri District, 25 km away. Plans a bore well. He has a chicken farm there also. He built it with technical advice from two guys from Kunduz helped by Ed Brooks (checked with Ed – this was Mojaddidi). They promised fry, but he has not seen them since.
- Plans another pond of 2000 m² near the airbase. Believes fish farming can be a good business.

Hj Abdul Wahid's ice factory, Panjab area, Mirwais Mirna (6th district).

With : Guard

- Capacity 600 blocks per day – sells all.
- Sells at Afg 100-150 per block.
- Goes to districts and town.
- 5 PPCO compressors 6.5 x 6.5 Pakistani and one broken Madina.
- Has a tubewell.
- Has a small genset and his own mains transformer.

MINUTE OF MEETING

At : 16 Ice plants, Kabul

With : Mr Afzal, owner, Afzal ice factory, Salangwot St, National Cinema area.

Date : 21 January 2006, 1345 hrs

Present: David Currie, Zubairullah

- This factory has capacity of 1200 blocks of 18 kg per day. They sell about 800 per day.
- Start April 1st and finish end of August. Sell at Afg 25 per block.
- One Moghul compressor of 75 Hp. Ammonia.
- They mainly use mains power but have a back-up 160 KVA genset.
- They have the property including the house up for rent and are going to move all the plant to a new location.
- There are 15-16 ice plants like this in Kabul. Some bigger, some smaller. The biggest two are: one on the Jalalabad Rd (about 20 km away); and, one new one in Polimontin (about 7 km away – we went to look for this but no-one in that area knew of it).

MINUTE OF MEETING

At : 17 Fertiliser market, Lashkargar

With : storekeeper

Date : 14 January 2006, 1550 hrs

Present: David Currie, Dr Fazel Elahi

- Plenty of stocks of fertilisers in the market: maybe 30 plus stores in one street.
- Examples of prices:
 - DAP 18:46:0 from Pakistan and Iran
Pak.Rp 1320/50 kg (= Afg 1122/50 kg = US\$ 22.44/50 kg = US\$ 448.80/mt)
 - Urea
Pak.Rp 760/50 kg (= Afg 646/ 50 kg = US\$ 12.92/50 kg = US\$ 258.40/mt)
 - TSP (from China)
Pak.Rp 700/50 kg (= Afg 595/50 kg = US\$ 11.90/50 kg = US\$ 238.00/mt)

MINUTE OF MEETING

At : 18 Fertiliser market, Kandahar

With : Mr Shaistagol, store owner. Ibrahim market area.

Date : 24 January 2006, 1100 hrs

Present: David Currie, Raz Muhammad Nizami

- Plenty of stocks of fertilisers in the market: quite a few stores in this area.
- Examples of prices:
 - DAP 18:46:0 from Pakistan
 - Afg 1060/50 kg (cf Afg 1122/50 kg in Lashkargar = US\$ 22.44/50 kg)
 - Urea
 - Afg 605/50 kg: another brand Afg 615/50 kg (cf Afg 646/ 50 kg = US\$ 12.92/50 kg in Lashkargar)
 - Iran 20% Phosphoric Acid, 19.8% Phosphorus, 6% 'good material' Afg 850/50 kg
 - Russian 'Superphosphate' Afg 850/50 kg
 - (cf Afg 595/50 kg = US\$ 11.90/50 kg in Lashkargar)

MINUTE OF MEETING

At : 19 University, Kandahar

With : Dir. Sayed Mohammed Kabri & Fish Farm fellow Alawadin Han

Date : 25 January 2006, 1130 hrs

Present: David Currie, Omer Sharif

- New buildings just being finished for the University. Good standard of construction. Funded by ARLDS - Asian Rural Development Foundation(?) 10 or 11 two storey buildings each maybe 40 m x 10 m.
- There are six departments in the University:

Agricultural Extension	Soil Science
Agronomy	Animal Science
Horticulture	Plant Protection
- They plan three main programs:

Poultry, goats and sheep
Plant Nursery
Fish Farming
- They have teachers but need assistance to get programs going. They have put in a request to PRT.
- There is a fish farm department inside the agriculture department. They want us to encourage and help people to get into fish farming as there is a good market in Kandahar and it would be very beneficial for farmers.
- They are targeting two goals for farmers – put in tube wells and farm fish within the system.
- Alawadin Han worked with FAO on a project in 2000. They brought in carp fry from Islamabad and distributed 10 fish per farmer to 25 ponds in 3 districts. Grew well but the drought the last four years killed off the stock and ended production.
- They support the idea of development along the canal – getting farmers to grow fish in the water between the canal and their fields.
- They support the idea of a hatchery at Dalah, though brood ponds would have to be a bit further away from the foot of the dam, where there are rocks and natural habitat (?). There is nowhere else in the Province with water. It was the lack of water that ended the FAO attempt.

Appendix 3 - Freight costs, distances & travel time

From Lashkargar

Truck	Capacity	To Kandahar	To Kabul
Refrigerated truck	2 mt	Afg 7000	Afg 20000
Small Mazda truck	5 mt	Afg 4500	Af 18000
Hino truck “6 bolt wheels”	10 mt	Afg 7500	Afg 25000
Hino truck “8 bolt wheels”	15 mt	Afg 10000	Afg 30000
Mercedes 10 wheel truck	24-30 mt	Afg 14000	Afg 50000
18 wheel truck- trailer	60-80 mt	Afg 28000	Afg 70000
Distance (km)		160	680
Travel time (h)		3	10

From Kandahar

Truck	Capacity	To Lashkargar	To Kabul
Refrigerated truck	2 mt	Afg 7000	Afg 40000
Small Mazda truck	5-7 mt	Afg 4500	Afg 10000
Hino truck “6 bolt wheels”	10 mt	Afg 7500	Afg 17000
Hino truck “8 bolt wheels”	16 mt	Afg 10000	Afg 22000
Mercedes 10 wheel truck	25 mt	Afg 14000	Afg 30000
18 wheel truck- trailer	30 mt	Afg 28000	Afg 50000
Distance (km)		160	520
Travel time (h)		3	7

From Kandahar

Truck	Capacity	To Spinboldak	To Nimroz
Refrigerated truck	2 mt	Afg 15000	Afg 50000
Small Mazda truck	5-7 mt	Afg 1500	Afg 10000
Hino truck “6 bolt wheels”	10 mt	Afg 2500	Afg 13000
Hino truck “8 bolt wheels”	16 mt	Afg 2500	Afg 15000
Mercedes 10 wheel truck	25 mt	Afg 5000	Afg 20000
18 wheel truck- trailer	30 mt	Afg 10000	Afg 30000
Distance (km)		125	460
Travel time (h)		2	7

Appendix 4 - Climatic data, Kandahar and Lashkargar ¹

Kandahar 1972

Months	Mean Monthly Temperature (C)	Mean Monthly Relative Humidity (%)	Mean Monthly Precipitation (mm)
January	6.7	61	50.8
February	10.0	58	35.8
March	15.0	49	37.1
April	20.6	43	23.4
May	25.0	37	7.6
June	28.4	33	0.0
July	31.1	30	2.3
August	27.1	20	-
September	21.1	20	-
October	18.2	28	1
November	12.6	38	4
December	9.4	49	24

Source: The Bioclimate of Afghanistan, Kabul University, 1972 (Translated from Dari)

Lashkargah (May, 2003 – May 2004)

Months	Average temperature (°C)		Average relative humidity (%)	
	Maximum	Minimum	Maximum	Maximum
January	19.5	6.7	80.9	60.1
February	23.1	7.2	70.3	46.6
March	29.3	12.5	49.8	30.4
April	34.5	17.4	38.3	24.3
May	37.5	10.2	30.4	20.1
June	45.0	25.4	31.1	17.7
July	48.8	29.7	38.4	20.5
August	44.0	25.2	33.4	19.0
September	36.5	19.1	33.3	20.1
October	31.0	12.3	36.0	21.4
November	22.7	6.4	51.6	32.9
December	19.2	3.7	70.2	46.6

¹ Sourced from Chemonics 11 Jan 2005 report: ALPS Edible Oils Refining Feasibility Study

Appendix 5 - Population data, Kandahar & Helmand ¹

The Central Statistics Office (CSO, Government of Afghanistan) of the Ministry of Economy has published population estimates for 34 provinces and 364 districts. Total population of Afghanistan for the year 1383 (2004-2005) is estimated as 23.2 million comprising of 1.5 million nomads, 4.7 million urban dwellers and 17 million rural dwellers. Of the total settled population of 21.7 million, 11.1 million are male and 10.6 million female.

Population data for the year 1383 (2004-05) for Kandahar and Helmand by district are as follows:

Kandahar Population Statistics		Helmand Population Statistics	
Kandahar city	432,300	Lashkargah	85,800
Daman	29,500	Nahr-e-Saraj	99,400
Arghandab	52,700	Kajaki	60,700
Shah Wali Kot	36,900	Moosa Qalah	50,300
Khakrez	19,400	Bhugran	69,400
Ghorak	8,200	Nowzad	43,300
Maiwand	49,900	Washier	13,300
Panjwai	74,100	Nad Ali	100,500
Reg	7,600	Nawa-i-Barakzai	79,100
Shorabak	9,800	Reg-i-Khanishin	22,400
Spin Boldak	96,400	Dishu	17,400
Arghistan	29,000	Garmser	74,800
Maruf	28,100	Sangin Qala	59,900
Zeri	73,100		
Myanesheen	12,800		
Nesh	11,400		
TOTAL	971,200		776,300