



Annual Report 2005

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Cover Picture

**A productive wheat field in Ensarona-Wayu woreda
under well-managed manual made broad bed and furrow
drainage system of the dominant vertsisols of the area**

Annual Report 2005



**Amhara Micro-enterprise development, Agricultural
Research, Extension, and Watershed management
(AMAREW) Project**

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Executive Summary: AMAREW Project Annual Report 2005

Based on the directives given by USAID/Ethiopia the AMAREW Project was restructured beginning in 2005. The restructuring made the Project more supportive to the New Integrated Strategic Plan (ISP) of USAID/Ethiopia. This Annual Report is the first under the restructured AMAREW Project. USAID/Ethiopia support for the Amhara National Regional State (ANRS) Food Security Program falls within the Mission's ISP Strategic Objective 16: Market-Led Economic Growth and Resiliency Increased. Under SO 16, IR 3 (Natural Resource Management and Agricultural Productivity Improved) supports the ANRS regional food security program through activities concentrated on adaptive, demand-driven food, agriculture and environmental research; and a participatory approach to dissemination of technology information, natural resource conservation, and environmental rehabilitation. The AMAREW Project addresses SO 16 with a specific focus on IR3.

In addressing this overall objective, the Contractor, Virginia Tech, works with its active consortium members (Cornell and Virginia State University) and its ANRS partners, the Food Security Program Coordination and Disaster Prevention Office (FSPCDPO) as coordinator, the Bureau of Agriculture and Rural Development (BoARD), Amhara Agricultural Research Institute (ARARI), and the Environment Protection Land Administration and Use Authority (EPLAUA).

The following were the thrust areas of the Restructured AMAREW during the year:

- Building the capacity of the research and the extension system with emphasis on ANRS researchers and extension specialists to concentrate on adaptive research and technology transfer on crops and livestock, soil and water management, environmental rehabilitation and natural resources management, feed and food utilization practices, with the ultimate aim of improving the quality of life for rural households.
- Building the capacity of the BoARD and ARARI with regard to community level watershed management, facilitating and providing technical and operational support for specific research, extension, and community watershed development activities.
- Building operational and management capacity of institutions within the context of reformed and strengthened research and extension services through the identification of long-term training, short-term training, in-service training, farmer demonstrations and linkages with other institutions.
- Contributing to strengthening research-extension-farmer linkage.

In implementing the project activities, the major components of the Restructured AMAREW are research, extension, watershed management, long- and short-term training, and micro-enterprise development integrated with all components.

Selected impacts of the Project:

Fuel efficient stove production at Yeku watershed: Fuel efficient stoves produced and marketed by an organized group of women like those at the Yeku watershed, not only helps them make money and contribute to reduction of deforestation, but also reduces the drudgery caused by frequent fuel wood collection from distant locations and encourages schooling of children.

Water Point Development: The Bambaw spring developed in 2005 by the Yeku community is exemplary of what an organized and motivated community can do. The spring has a concrete box with sand filtering system, separate water delivery point for humans and livestock. The spring

provides clean potable water for over 200 households and meets the water needs of more than 600 livestock per day.

A Progressive and Early Adopter Farmer: Ato Dessalew is a model project supported innovative farmer in Lenche Dima. He has protected his farm land with bench terraces, rehabilitated gullies adjacent to his farm, and constructed a dome-shaped water harvesting structure and used the collected water to for growing banana, papaya, mango, and several vegetables, thereby improving his household income significantly.

Degraded Gullies Made Productive: The project used very simple sand bag check dams to minimize erosion and save soil resources. Once adequate silt was accumulated, multi purpose forage species were directly sown on the silt layer. Community assigned users have the right to utilize the grass employing the cut and carry system and harvesting any other proceeds. Users also have the obligation to maintain the physical structures before and after the rains.

Hillside Closure Speeds up Environmental Rehabilitation: The most encouraging and sustainable results we obtained are from natural resources conservation under community owned closed area management system where self-help user groups have been organized to manage degraded hillsides in Yeku. Under this system, an area to be closed and managed was identified by the entire watershed community with the facilitation role of the Community Watershed Management Organization (CWMO). Farmers have started to observe that natural regeneration in the closure sites has allowed new emerging shrubs and grass species, which were not visible in the past. The extensive physical conservation works constructed by the communities in the closed areas have essentially curtailed the excessive run-off from the surrounding hillsides, resulting in increased infiltration and improved ground water recharge.

Rope and Washer Pump Technology Supplements Water-Harvesting Schemes: The Sirinka Agricultural Research Center (SARC) of ARARI developed the rope and washer pump which is a low cost and promising technology to assist the regional water-harvesting program. The center carried out in Tehuledere woreda demonstration trials of the new pump technology on 21 households owning water harvesting structures and growing fruits and vegetables.

Striga Resistant Sorghum Varieties Yielding High Under the Menace: SARC is continuously engaged in identifying *Striga* resistant sorghum varieties that meet farms' needs. The endeavor enabled the release of varieties that revived rural households hopes of survival under the menace of the parasitic weed. Varieties such as Gobiye and Abshir are now widely grown in farmers' fields in Kobo-Girana valley, yielding about 30 q/ha where susceptible local varieties may not give any significant yield at all.

Vernonia is a New Promising Industrial Oil Crop: An emerging industrial value oil crop receiving research-extension attention in terms of variety development, seed increase, and market research through the support of AMAREW is the indigenous weed but potential industrial oil crop, Vernonia. Intensive tests and seed increase activities are being carried out in the region, around Sirinka and Adet.

Long-term Training Motivates Experienced Staff Stay on the Job: With the support of AMAREW, over 30 research and extension workers are pursuing their higher degree studies in local universities such as Mekelle, Alemaya, Dehub, and Bahir Dar.

Inductive Training for the Novice Research Worker: Inductive training for newly recruited staff enhances competence and promotes swift integration into the Research System. ARARI and AMAREW jointly organized a one-month long module-based inductive training in 2005. The trainees were 45 junior agricultural research workers recently recruited by ARARI and assigned to its seven research centers.

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Amhara Micro-enterprise development, Agricultural Research, Extension, and Watershed management (AMAREW) Project

1. Background and Project Management

1.1 Background

At the end of 2004, USAID/Ethiopia indicated its desire to restructure the AMAREW Project, following which the restructuring was completed early in 2005. The elements of the restructuring were received officially through letters from the USAID Mission Director and the Contracting Officer sent to the appropriate offices. This Annual Report is the first under the restructured AMAREW Project.

1.2 The New Integrated Strategic Plan (ISP) of USAID/Ethiopia

USAID/Ethiopia support for the Amhara National Regional State (ANRS) Food Security Program falls within the Mission's ISP Strategic Objective 16: Market-Led Economic Growth and Resiliency Increased. SO 16 includes four Intermediate Results (IRs): (1) Selected Essential Policy Reforms Implemented; (2) Selected Input and Product Markets Strengthened; (3) Natural Resource Management and Agricultural Productivity Improved, and (4) Livelihood Options for the Food Insecure Protected, Expanded, and Diversified. Under SO 16, IR 3 (Natural Resource Management and Agricultural Productivity Improved) will support the ANRS regional food security program through activities concentrated on adaptive, demand-driven food, agriculture and environmental research; and a participatory approach to dissemination of technology information, natural resource conservation, and environmental rehabilitation. SO 16 seeks to empower professionals at all levels to try innovative approaches, and households and communities to take responsibility for resolving their problems by making informed choices in planning and implementation of agricultural and natural resources management technologies. The AMAREW Project strives to contribute to the overall achievement of SO16 in the ANRS.

1.3 Consortium Members

Within the context of the Restructured AMAREW, the primary and Contractor University is still Virginia Tech. All project management responsibilities including all personnel, are assumed by Virginia Tech. Cornell University and Virginia State University continue to serve as members of the AMAREW Project consortium. The Contractor has set aside Technical Assistance funds to be accessed by all members of the consortium based on ANRS partners request and demand for their respective areas of expertise. Additionally, selected members of the Collaborative Research Support Program (CRSP) Universities participate in the AMAREW Project activities through the Small Grants and Mentorship Program (SGMP).

1.4 Amhara National Regional State (ANRS) Primary Partners

With the coordination of the Food Security Coordination and Disaster Prevention Office (FSPCDPO), the additional partners of the restructured AMAREW Project are the Bureau of Agriculture and Rural Development (BoARD), Amhara Agricultural Research Institute (ARARI), and Environment Protection Land Administration and Use Authority (EPLAUA).

1.4.1 Food Security Program Coordination and Disaster Prevention Office (FSPCDPO): The FSPCDPO is the overall coordinator of the activities of the AMAREW Project including chairmanship of the Regional Implementation Team (RIT), which oversees the activities of the restructured AMAREW. The Project often undertakes additional activities as needed to ensure the effective integration of all USAID-supported programs contributing to the Food Security Program of the ANRS. At the watershed management level, the participation of the Safety Net Project is essential for food resource provision for implementing planned activities.

1.4.2 Bureau of Agriculture and Rural Development (BoARD): Appropriate BoARD departments are expected to support activities in the Agricultural Research / Extension/ Watershed Management Support Program. The BoARD, working in coordination with the FSPCDPO, has the principal technical leadership role for carrying out the USAID-supported extension and integrated watershed management activities in the region.

1.4.3 Amhara Agricultural Research Institute (ARARI): ARARI coordinates research among the principal agricultural research centers, sub-centers, rural technology centers, and the Ethiopian Institute of Agricultural Research Organization (EIAR). ARARI's principal mandate is to insure that research activities conform with and contribute to the region's food security strategy. AMAREW works directly with ARARI in supporting and technically advising the institute in technology generation and on-farm research, capacity building, and strengthening research-extension linkage. The main centers with which the restructured AMAREW works are Adet, Gondar, Sirinka, Sekota, and Debre Berhan.

1.4.4 Environment Protection Land Administration and Use Authority (EPLAUA): EPLAUA has the ANRS-wide mandate for the overall environment and land related policies and issues in the region. For the purposes of the AMAREW Project, the relevant activities of the EPLAUA fall under land administration, demarcation, and certification. In particular, the role and participation of the EPLAUA in the pilot watersheds are important. The Project works with EPLAUA in our areas of mutual interest.

1.5 The main Restructured AMAREW Project objectives for the year were:

- Building the capacity of ANRS researchers, research institutions, and research and rural technology development centers to conduct demand-driven applied research on low input, environmentally sustainable technologies that can be applied immediately to food insecure areas. This approach focused on adaptive research on crops, cropping systems, soil fertility management, water management, environmental rehabilitation, natural resources management, animal feed, and food utilization practices.
- Building the capacity of the extension system to disseminate information on environmentally sound agriculture and natural resource management practices, and support other activities that improve the quality of life for rural households in a participatory manner.
- Building the capacity of the BoARD with regard to community level watershed management. Emphasis was given to interacting with community watershed organizations to plan and implement activities in a participatory manner.
- Building operational and management capacity of institutions within the context of reformed and strengthened research and extension services through the identification of long-term training, short-term training, in-service training, farmer demonstrations and linkages with other institutions.
- Serving as an effective partner to the Ethiopian Institute of Agricultural Research Organization (EIAR) and the Amhara Regional Agricultural Research Institute (ARARI) on all policy matters related to national and regional research strategies, food security, and human resource development.
- Facilitating and providing technical and operational support for specific research, extension, and community watershed development activities managed by the principal ANRS institutions.

1.6 Major Components of the Restructured AMAREW

1.6.1 Research: Agricultural research activities in the ANRS are directed by Amhara Regional Agricultural Research Institute (ARARI), which coordinates its research program at the national and international level through EIAR. During the year, the major objectives of the research activities were to improve production and productivity through the development and/or introduction of appropriate new technologies. A second but equally important objective was to strengthen human and institutional capacity to sustain the participatory approach to agricultural research and extension.

1.6.2 Extension and Integrated Watershed Management: Two separate, but related, activities were coordinated through the ANRS extension service under IR3. These are: (1) ANRS extension service delivery programs; and (2) integrated watershed management activities in selected watersheds in close cooperation with the Safety Net Program to address natural resource management requirements and build the assets of rural households in the pilot watersheds. AMAREW provided technical assistance, oversight and management support in extension and integrated watershed management.

Extension activities were implemented in collaboration with the research and watershed management components. The underlying principle was to build the capacity of BoARD extension personnel to effectively disseminate technology information to rural households using participatory methodologies.

AMAREW continued to use and promote its two established pilot watersheds (Lenche Dima and Yeku) as learning and demonstration centers for integrated and participatory watershed management. Among the lessons demonstrated to visitors of these centers are strategies and methods of community organization for watershed management, approaches and practices in rehabilitation of gullies and reclamation of usable land, integration of research and extension, utilization of technologies for natural resource conservation and enhanced productivity, community participation in planning and implementation of integrated watershed management, establishment and management of area closures, and integration of income generating activities with watershed management practices. Various groups such as farmers, researchers, extension agents, development workers, woreda level authorities, policy makers, and individuals with the overall interest on integrated watershed management visited the learning centers.

1.6.3 Degree Training: Degree training for selected ANRS professionals is a major activity for building human and institutional capacity and facilitating the research/extension paradigm shift. AMAREW has established a partnership relationship with Ethiopian Universities for BS and MS level training. The selection of professionals for training was conducted in a competitive and transparent manner. MS research projects, which form part of the degree requirements, normally take place in the ANRS, with an emphasis on subjects, which respond to research and extension problems of the region.

1.6.4 Micro-enterprise Development (MED): Although the MED component was not allocated funds through the Restructured AMAREW, the project continued its concerted efforts to establish collaborative links with MED related multi-regional enterprise/market development initiatives funded by USAID and other donors. As a part of the work of the extension and watershed management components, MED related activities such as improved fuel efficient stoves, gabion production, seed production of improved crop varieties, improved fish production and marketing, and horticultural crops production and marketing, were covered by the Restructured Project during the year.

1.7 Focus Areas (Woredas)

The RIT took great care in selecting eight pilot woredas for research and extension activities in order to enhance synergy and maximize activity integration in terms of information dissemination, resource availability, and market access. The list of the pilot woredas (by zone) selected by the RIT for initial pilot efforts are given below in Table 1 for each Project component:

Table 1. Selected pilot target woredas by zone and major activity components for the Restructured AMAREW Project, 2005

Target Area	Research	Extension	Watershed
Wag Hamra Zone			
Sekota Woreda	X	X	X
North Wollo Zone			
Gubalafto Woreda	X	X	X
South Wollo Zone			
Tehuledere Woreda	X	X	<i>x</i>
South Gonder Zone			
Lay Gayint Woreda	X	X	<i>x</i>
North Gonder Zone			
E. Belessa Woreda	X	X	<i>x</i>
North Showa Zone			
Ankober	X	<i>x</i>	
Ensarona Wayu	X	<i>x</i>	
West Gojam Zone			
Sekela	X	X	X

Note: *x* indicates reduced level activities

High Potential Areas: The RIT agreed to include two woredas in North Showa zone, Ankober and Ensarona Wayu, as high potential areas for the active involvement of the project’s research component. Ankober is well known for its high potential in potato and barley production while Ensarona Wayu is noted for its outstanding wheat and pulses production. Efforts were made to disseminate research results to end users through the extension systems.

The RIT also endorsed adding one more watershed with high potential characteristics. The watershed that met this requirement and had been adequately studied and characterized in connection with the original concepts of initiating the AMAREW Project is the Gumet Watershed in Sekela Woreda of West Gojam Zone. This watershed was originally selected and studied as one of the four pilot watersheds for USAID support. AMAREW has scaled up the promising lessons learned in the integrated watershed management of the two pilot sites (Yeku and Lenche Dima) to Gumet and established rapidly watershed management communities patterned after Yeku and Lenche Dima.

1.8 The Role of the Regional Implementation Team (RIT)

As in the past, the Regional Implementation Team (RIT) maintained the oversight responsibility of the AMAREW Project where the FSPCDPO chaired and coordinated the Project activities. The RIT met at least once in three months to monitor project progress. The RIT members are Heads (or their representatives) of FSPCDPO, BoARD, ARARI, ACSI, AMSEIDB, EPLAUA, CPB, AMAREW, USAID, and BoFED. The RIT reviews and approves plans and reports, before submitting them to USAID/Ethiopia.

1.8.1 AMAREW Project RIT Members of 2005, attending one meeting or more:

Ato Amlaku Asres, (Head, FSPCDPO, Chairman)
Dr. Getachew Alemayehu, (DG, ARARI)
Dr. Enyew Adgo, (Director, NRM Research)
Ato Getie Asfaw, (Planning Dept Head, BoARD)
Dr. Zerfu Hailu, (D/Manager, EPLAUA)
Ato Bayeh Tiruneh,(Land Admin. Dept, EPLAUA)
Ato Getachew Haile, (EPLAUA)
Ato Getahun Alemneh, (EPLAUA)
Ato Setotaw Abay, (Training Head, AMSEIDB)
Ato Shiferaw Asegu, (AMSEIDB)
Ato Getaneh Gobezie, (Planning Dept Head, ACSI)
Ato Ayenew Belay, (Head, CPB)
Ato Abay Akalu, (CPB)
Ato Amsaya Anteneh, (D/Head, BoFED)
Dr. Tadele Gebreselassie, (AMAREW Project CTO until Aug 2005, USAID)
Dr. Belay Demissie, (AMAREW Project CTO from Nov 2005, USAID)
Dr. Brhane Gebrekidan, (CoP, AMAREW Project)

1.8.2 Selected items addressed and decided on by the RIT in 2005

1. The RIT collectively agreed to support the continuation of the AMAREW Project for the next three years (2005-07) following the elements of restructuring specified in the Mission Director's letter on the matter. This support was backed by specific letters written by the primary ANRS partners of the Project, namely FSPCDPO, ARARI, and BoARD.
2. The RIT discussed, amended, and finally approved the Project restructuring document for the next three years.
3. The allocation of project funds was agreed to be in a 50:50 split between the Contractor (Virginia Tech) and the ANRS partners.
4. During 2005, it was recommended that 10 BS and 3 MS level new training positions be supported through the Contractor's portion of the budget and all concerned parties agreed to this suggestion.
5. New intakes of diploma level trainees for upgrading to BS level, expected to take 5 years to get their degrees, should be paid for through the Contractor (Virginia Tech) including the necessary funds in its 2007 annual budget. It was also agreed that the said funds should be deposited with the employer organization of each student for the two summer expenses after the termination of AMAREW.
6. The RIT agreed on the final revised budget and text of the 2005 work plan and recommended that it be submitted to the USAID Mission for approval.
7. Liquidation of USAID funds by ANRS partners continues to be a problem. The RIT urged all ANRS partners to liquidate all their outstanding balances. As of the end of the year, the ANRS partners of AMAREW were very far behind in submitting the required financial reports to the FSPCDPO and eventually to USAID. ANRS

partners barely managed to utilize the first tranche (40%) of the funds advanced to them.

8. Despite the persistent efforts of both the FSPCDPO and the AMAREW Project it was difficult to obtain on time all the necessary expenditure vouchers from BoARD, WOARDs, ARARI, and EPLAUA. It was obvious that the different entities receiving project funds from USAID had varying rates of expenditures, with some spending all the money allocated to them while a few had spent very little of the money advanced to them.
9. The RIT expressed its grave concern on the slow fund utilization and delayed project implementation schedule. To this effect, the RIT recommended that a team composed of FSPCDPO, BoARD and AMAREW should be dispatched to the project pilot woredas to assess the situation and collect the necessary documentations. This was done and limited accounting reports were collected at the end of 2005.
10. The RIT was briefed that joint planning activities involving WOARDs and ARARI centers were scheduled and done. The RIT supported these efforts and encouraged all stakeholders to develop a work plan in a joint and participatory manner in which research, extension, and staff of woredas take active part. The 2006 work plan was finalized through such participatory process. The RIT noted with satisfaction that joint planning activities involving WOARDs and ARARI centers have been effectively done.
11. The RIT recommended that a one-day workshop involving appropriate participants from BoARD, ARARI, RIT and AMAREW be arranged in a suitable location to discuss the slowed project implementation issues and problems and formulate appropriate solutions. This was done in Woldiya and the complete proceedings of the Woldiya workshop were produced and distributed.
12. The high rate of staff turnover and the frequent change of project focal persons in most woredas made follow up of project activities difficult.
13. The BoARD representative in the RIT confirmed that inadequate human capacity both in quantity and quality at the woreda level, too many and too frequent staff transfers and/or resignations, current staff overload with too many and diverse activities, the new single-pool financial system being cumbersome and a hindrance to timely implementation of planned activities, and the linkage between the BoARD Head Office and the WOARD being loose were major problems.
14. Further use and strengthening of the Farmer-Research-Extension-Groups (FREGs) was recognized as an important strategy to address the shortage and efficient distribution of improved seeds to target farmers in each woreda. The RIT concurred that as a model seed project, "Potato Seed Multiplication and Distribution", with the active involvement and participation of FREGs in selected woredas where potatoes are produced, should be encouraged and strengthened.
15. The RIT also recommended that a mini-workshop to launch the Gumet watershed activities (Sekela woreda program) be organized in the woreda and this was done with the participation of ARARI, BoARD, AMAREW, RIT, and Sekela woreda staff.
16. The RIT noted that some planned activities in the 2005 work plan, such as delivery of improved seeds of various crops to the focal woredas have not met the planned

target because of the delay in fund release and transfer. The RIT recommended that the necessary modifications be made in the plan so that other non-season sensitive activities could be substituted to use the allocated annual funds. This was done through the leadership of the Extension Advisor of the Project.

17. The following milestones and target dates for the release of AMAREW Project funds to our ANRS partners by USAID/Ethiopia were accepted by the RIT:

Milestone	Target date, USAID to transfer fund to FSPCDPO	Percentage of approved budget to release	Requirements and precondition for release
I	January 1	40%	Approved work plan submitted
II	April 1	30%	Confirmation by FSPCDPO to USAID/Ethiopia that 80% of the funds received have been utilized and work plan is being implemented on schedule
III	August 1	30%	Confirmation of trials planted, data collection underway, and research/extension/farmers visit is on track

18. The following time frame for the mid-term evaluation was accepted by the RIT:

Activity	Target Date	Responsible Person
Draft scope of work (SOW) sent to the RIT	August 31, 2005	Dr. Tadele Gebreselassie, (CTO)
RIT discusses SOW, revises it as appropriate, and sends the revised version to the CTO	September 15, 2005	Dr. Brhane Gebrekidan, (CoP)
Evaluation team arrives in Bahir Dar and starts its work	November 15, 2005	CTO, CoP, and the Evaluation Team
Preliminary Report available from the evaluation team	December 15, 2005	Evaluation Team

19. By the end of the year, the mid-term evaluation was not implemented as scheduled because of the resignation of the Project CTO, Dr. Tadele Gebreselassie. The RIT and the new CTO, Dr. Belay Demissie, agreed to reschedule the mid-term evaluation for 2006. Some members of the RIT indicated that the optimum time for such evaluation would be during the crop season prior to harvest.
20. The RIT recommended that AMAREW partner organizations in the ANRS receiving USAID funding should submit to the FSPCDPO both technical and financial reports at least quarterly by the end of March, June, September, and December, with a copy to the AMAREW Project Office.

1.9 Project Administration

Project administration, during the year, as in the past, was done both at the Home Office level in Virginia and the Project's country office in Bahir Dar.

1.9.1 Home Office

The Project's Home Office at Virginia Tech continues to be responsible for all guidance and support services to the project including financial, technical, and administrative supports. Personnel for Technical Assistance and Mentors for the Small Grants and Mentorship Program are identified and dispatched to the field by the Home Office. Monthly financial reports are submitted from the field to the Home Office and regular replenishments of project funds are made from the Home Office to the field. Regular electronic communications as well as selected visits by officials from the Office of International Research, Education and Development (OIREED) ensure close interaction and communication with the Home Office. In this connection, during the year, Dr. Mike Bertelsen, Associate Director of OIREED and Associate Dean of the College of Agriculture and Life Sciences, visited Bahir Dar and Addis Ababa and interacted with USAID/Ethiopia, ANRS partners, and project staff on the progress being made on the restructured AMAREW. Dr. Bertelsen's visit and discussions helped in revising and amending project staff employment contracts.

1.9.2 Bahir Dar Office

- The Restructured AMAREW Project Document was revised and submitted to USAID and approved during the first quarter. After the Project restructuring, our funding status stabilized and we had chance to focus on stronger follow-up of planned activities;
- The Contractor's (Virginia Tech) portion of the annual budget was fixed as 50% of the total Project budget while the remaining 50% of the fund was allocated to our ANRS partners.
- After a long delay in the finalization of the 2005 AMAREW Project Work Plan, the RIT and USAID approved the plan and was distributed to all stakeholders at the end of March.
- Monthly financial were prepared and submitted to Virginia Tech regularly and replenishment requested and received.
- All quarterly reports as well as the 2004 Annual Report were prepared and submitted to USAID on time, and distributed to RIT members, ARARI Research Centers, USAID and different ANRS partners.
- R2D was an active partner of our project and it was the main source of grain for our watershed management physical activities but at the end of 2004 it phased it out and replaced by the Safety Net Program. We were able to get a special consideration to get food resources through SC-UK for our 2005 watershed activities.
- The RIT members recommended that both ACSI and AMSEIDB should continue as RIT members, although project funds were terminated to these two entities during the year.

- Milestones for the release of AMAREW Project funds to our ANRS partners, in three tranches, were set and agreed upon by the RIT and USAID.
- The underutilization of the allocated budget to the ANRS partners was a matter of concern during the year. The main problems causing the underutilization of the budget were the single pool woreda financial system as well as the engagements of WOARD staff in election related activities not related to agricultural extension.
- Almost all woreda office professionals, DAs, and experts were engaged in a series of government organized long seminars during the year. Also, the same staff were engaged for months in the national election activities both before and after the May elections.
- The problem of project focal persons frequently changing at each Woreda was another matter of concern for lack of efficient project implementation during the year.
- The RIT had agreed that the midterm evaluation of AMAREW, by an independent team, should be done before the end of 2005. However, because of the resignation of the CTO, this was not implemented as planned.
- Dr. Belay Demssie was designated in November as the new CTO of the AMAREW Project following the resignation of Dr. Tadele Gebreselassie in August 2005.
- The AMAREW Project Personnel Manual was revised and implemented during the year.
- Virginia Tech approved the new employment contract agreements for AMAREW employees for one year for the July 2005 to June 2006 period.
- Dr Mike Bertelsen, Associate Director of OIRED, Virginia Tech, visited Bahir Dar to follow the project progress during mid-October and provided the necessary support and guidance.
- AMAREW activities can now be read and seen by visiting its new web site, <http://www.oired.vt.edu/amarew/>
- Following the resignation of Dr. Elias Zerfu in June 2005, Dr. Eshetu Mulatu joined the Project as the Training Advisor and Farmer-to-Farmer Project Coordinator in August 2005.
- Ato Yitayew Abebe, the Watershed Management Advisor, resigned in November 2005 and his replacement will be hired early in 2006.
- Two Project drivers, Ato Nebiyu Mussie and Beyene Negash, resigned from the Project during the year. Ato Yitayeh Endalew has been added as a new driver.
- AMAREW staff participated in the workshop “Sustainable Development and Poverty Reduction II” which focused on the past three years work evaluation and on what will be done in the next five years in the Amhara Region.
- AMAREW also participated during the year in the BoFED organized bilateral and multilateral donors conference in March.
- The AMAREW staff presented a paper focusing on lessons from the AMAREW Project to the EAF-EARO International Symposium in June 2005.
- The Project worked with Virginia State University in developing the global theme, IPM CRSP funded, Parthenium IPM Project. Virginia State won the grant and AMAREW is an active partner in its implementation.
- The CoP has been nominated for membership and now serves in the Technical Advisory Council (TAC) of EIAR (formerly known as EARO).

- The CoP participated in the Conference on Integrated Striga Management (ISM) organized in Addis by the EIAR with the technical and financial support of INSORMIL and coordinated by Purdue University.
- Small grant activities have been going on well during the year. Professor Tollner of the University of Georgia visited Bahir Dar for a week in early 2005 and worked with Mihret Endalew of ARARI on their joint research and gave a half-day seminar in the AMAREW Project office conference room. Dr. John McPeak of Syracuse University visited Debre Berhan, worked with Tilaye Teklewold, and also gave a seminar at the Debre Berhan Research Center.
- The National Watershed Management Workshop conducted at Nazreth was fully funded by USAID through AMAREW and was organized by the AMAREW Project. The resulting National Watershed Management Guideline was published by the MoARD with the support of AMAREW.
- Dr. Joseph Tritschler and Dr. Asmare Atalay visited Bahir Dar to work on the Farmer-to-Farmer initiative managed by Virginia State University. AMAREW collaborates with VSU in the FtF implementation in the Amhara Region.
- Dr. Wondi Mersie of Virginia State University obtained a wide range of Reference Books, Tutorials and CDs for ARARI Research Centers and Headquarters and these were presented to the DG of ARARI and distributed to the appropriate locations.

2. Project-wide Selected Success Stories and Problems

Details on specific accomplishments and problems encountered during the year are given in the individual component section of this annual report. The section below presents selected success stories and major problems encountered during the year.

2.1 Selected Success Stories of the Project

Fourteen selected success stories or impacts across the different components of the project are summarized below. The activities reported under this section have been underway for one or more years. The reporting format for these stories follows the guideline proposed by USAID.

2.1.1 Fuel efficient stove production at Yeku watershed

USAID/AMAREW strategy has gender dimensions in which it empowers rural women by organizing them into different self-help income generating groups



Photo: AMAREW Project

Fuel efficient stoves produced and marketed by an organized group of women like those in Yeku watershed, not only helps them make money and contribute to reduction of deforestation, but also reduces the drudgery caused by frequent fuel wood collection from distant locations and encouraged schooling of children. Additional advantage accrued was that the improved stoves as they contain smoke inside reduce smoke caused eye problems

Most Ethiopians in rural areas traditionally use wood fire for cooking in the open. The pot or pan is normally centered and placed on three stones. Open fires waste fuel because they focus flames and heat poorly on the bottom of the cooking pot. They are typically only about 15% efficient, which means 85% of the energy that is released from the cooking fuel is wasted. With the use of improved and fuel efficient stoves, it is possible to increase efficiency up to 50%, which can contribute to reduced deforestation significantly. More importantly, improved stoves, which burn wood in a closed area, reduce smoke in the kitchen and its negative consequences upon the health of women and children.

At the Yeku (Sekota) watershed, ten women as a team were trained by the AMAREW Project on improved stove production in 2004 and at the present moment they have reached a stage of being registered as a cooperative through the cooperative promotion bureau. The project initially provided these women with the necessary stove molds. The women contributed part of their own funds to start the stove production. They started the production of improved stoves with an initial capital of 500 Birr (60 US \$). Presently, the women group has raised its capital to over 7,000 Birr (810 US \$). This amount was sufficient to provide each member of the stove production and marketing micro-enterprise with a dividend of 500 Birr (60 US \$) after saving to the initial capital 2000 Birr (230 US \$). Individual annual saving of this amount by women were simply unthinkable cases earlier in areas like Yeku, Sekota.

With the increased efficiency by 50% through the use of improved stoves, it is possible to reduce deforestation rate by 50%, which will ultimately result in vegetation cover increase.

Increased efficiency reduces the household's fuel wood requirement, which indirectly reduces the frequency of wood collection by women and children. This should enable women to be involved in more productive work and leisure time while children will get improved opportunity to attend school. It means, the intervention has an environmental, social and economic positive impact.

2.1.2 Gabion Wire Box Production at Lenche Dima Watershed

USAID/AMAREW assists resource-constrained farmers to develop micro-enterprises that produce locally unavailable but highly demanded materials to promote local development endeavors



Photo: AMAREW Project

Resource poor rural household heads were trained in gabion box production and provided with a starter capital in kind to engage in an income generating activity like this one in Lenche Dima watershed. The self-help group produces and markets highly demanded but locally unavailable gabions. This activity helped them to supplement their annual income with cash and to make gabions that were procured earlier from places as far as 350 km, easily available to the communities at lower cost

An on-going activity in the area of micro-enterprise development of the AMAREW Project includes gabion wire box production at the Lenche Dima pilot watershed. There is a high demand for gabion boxes in the woreda and its surroundings due to severe gully formation in various watersheds. The nearest source of gabion boxes for the Lenche Dima area is either Debre Tabor or Addis Ababa with a cost of 350 Birr (40 US \$) per box. The same gabion produced by the newly organized self-help group on site costs only 120 Birr (14 US \$), which is 65% less than from what a gabion produced elsewhere costs. The production of gabion boxes at Lenche Dima, in addition to raising incomes of poor farmers' group, will greatly reduce government and non-government institutions' time and money spent through long distance travel for the procurement of gabion boxes.

In view of these facts, the AMAREW Project arranged for the training of selected farmers in gabion production and provided the initial materials for production. Now the gabion production activity in the watershed is functioning in full swing.

Gabion producers at the Lenche Dima watershed are presently contracted by the woreda office of agriculture to produce gabion wire boxes for the various food security programs within the woreda and at zonal level. In economic terms, one gabion-producing farmer within a month can make cash income equivalent to his/her annual income from crop production. To assist farmers to devote all the necessary attention and time to their farming, gabion production is deliberately scheduled during the slack season of January-March.

The entire gully rehabilitation activity led by AMAREW Project at Lenche Dima watershed in partnership with Gubalafto woreda office of agriculture and Sirinka research center uses gabions produced on the site by these producers. This, beyond increasing efficiency of the gully rehabilitation work, enabled communities to do the work with a lower cost. Using such gabion and other structures, the community in Lenche Dima is successfully rehabilitating a gully which has once been considered a major threat to farm lands and thereby the livelihoods of farm families.

2.1.3 Water Point Development: Top Priority for the Yeku Community

USAID/AMAREW's community empowerment strategy has different dimensions and focuses on addressing the needs of the disadvantaged



Photo: AMAREW Project

For children like Tariku Walelign and friends drinking leech free clean water and going to school is a privilege that comes with the development of a water point in their village

One of the major problems in AMAREW Projects Yeku and Lenche Dima pilot watershed management intervention sites is the shortage of clean water for humans and livestock. Communities at Yeku have identified water shortage as their primary constraint for the integrated watershed development effort in their watershed.

It is women and children of school age, particularly girls, who should collect drinking water for the family from long distances, whereas boys are responsible to water livestock by collecting leech free water from distant rivers. This burden of collecting water has significantly reduced school enrollment of children.

To solve this water shortage problem, the community at Yeku ranked water point development as top priority. Subsequently, with the support of AMAREW, the community developed water sources including springs and shallow hand dug wells. Labor and locally available construction materials such as sand, stone, gravel & water were provided by the community while the project provided materials that are not locally available including cement, reinforcing iron rods, pipes, fittings, and skilled labor cost.

The *Bambaw* spring developed in 2005 by the Yeku community is noteworthy. The spring has a spring box with sand filtering system, separate water delivery point for humans and livestock along with a protected washing stand. The spring provides clean potable water for over 200 households and meets the water needs of more than 600 livestock per day.

The *Bambaw* spring is managed and operated by a water committee established by the community where women play a significant role also. Moderate water use fees are collected to cover routine maintenance and costs for guards. The contribution of the newly developed spring in terms of reducing workload for women and children and improving human and livestock health is highly appreciated by the community. Farmers now say, now that we have easy and affordable access to clean and piped water from a spring which is leech free, we can now afford and manage to send our children to school.

2.1.4 Ato Dessalew: A Progressive and Early Adopter Farmer

USAID/AMAREW watershed management intervention brought empowerment of watershed communities towards sustainable management of



Photo: AMAREW Project

Ato Dessalew, is an innovative farmer, who has protected his farm land with bench terraces, rehabilitated a 6m deep and 4m wide gully adjacent to his farm and constructed a dome-shaped water harvesting structure and used the collected water to grow diverse crops including fruits like banana, papaya, mango, and additionally several vegetables, which beyond arresting soil erosion has improved his household income

Ato Dessalew is a 35 years old farmer at the Lenche Dima watershed. He is married and has two children. He is one of the early adopters of new technologies that the AMAREW project promotes. His land holding size is about half a hectare converted to a well managed bench terraces with elephant and Vetiver grasses, Sesbania, Pigeon pea planted on bunds for forage production and bund stabilization. He has rehabilitated a gully adjacent to his farm by planting eucalyptus trees. Every year he sells eucalyptus poles from the rehabilitated gully and earns 500 Birr (60 US \$).

Dessalew was the first farmer in the community to show interest in the construction of dome-shaped water-harvesting structure. He selected the site for the tank to be at the upper bench of his plot so that he could water his plants using gravity flow. Since the construction of the tank, he has planted more than 20 improved banana seedlings, over 50 fruit trees of mango, avocado, orange, and papaya, as well as vegetables (garlic, peppers, sweet potato, and pumpkin). He has planted adequate forage grass and trees in addition to his eucalyptus wood lot on the rehabilitated gully. His wife is also engaged in growing vegetables such as pepper, onion, and cabbage through supplementary irrigation. Additionally she raises improved chickens. She has been trained in improved stove production and home management.

Ato Dessalew said, “When I began constructing the water tank, I started it half heartedly. The project took my colleagues and me to visit a tank already in use. During that visit, for the first time in my life, I saw sweet potato, carrot, and beetroot grown in an area smaller than mine. I volunteered right there to complete the well construction and it didn’t take me a week to complete the digging. Now I have every thing in my own compound. My wife is engaged in vegetable production and has created cash income from the sale of these products. We have now started eating vegetables thanks to the training that my wife got through the project’s support. My cattle are no more taken long distance in search of water after the construction of the tank. I have noted that my neighbors are showing increasing interest on what I do. One of my neighbors has already constructed a water tank similar to mine. This is how farmers learn. A farmer wants to see not to hear”.

2.1.5 Degraded Gullies can be Made Productive

Throughout the ANRS, including the AMAREW Project pilot watersheds, deforestation aggravates excess run-off and causes gully erosion on productive farmlands at the foot of hillsides. In our Project area, most farmlands at the foot of degraded hillsides are highly dissected with gully erosion.

Increasing amount of extensive productive farmland is lost through gully erosion each year. However, with proper management, gully beds and sides could be converted into productive land for livestock feed, growing construction and fuel wood, and fruit tree production



Photo: AMAREW Project

BEFORE: The Lenche Dima watershed is a typical example where the devastating effect of gully erosion could be illustrated. The watershed has a total area of 1500 ha of which cultivated land covers 900 ha. It is estimated that there is about 20 km of gully network within the cultivated land. Reclaiming these gullies has been taken as a major challenge for the watershed communities.



Photo: AMAREW Project

A transformed gully after two years of rehabilitation

AFTER: The project used very simple sand bag check dams since the availability of stone for gabion and loose stone check dam is limited. Once adequate silt is accumulated, usually after the first three or four rains, multi purpose forage species were directly sown on the silt layer. The community divided the whole gully length into small sections and allocated each to a user who has land holding adjacent to the gully. The user has the right to utilize the grass employing the cut and carry system and harvesting any other proceeds. He also has the obligation for maintaining the physical structures before and after the rains, plant trees and other plants as appropriate.

2.1.6 Hillside Closure Speeds up Environmental Rehabilitation

Extensive physical and biological conservation works have been carried out in Yeku and Lenche Dima watersheds through food for work as well as free community labor mobilization. The physical conservation works include extensive hillside terracing, check dams using stone/gabion/sand bag, stone and soil bunds, eyebrow and micro-basins, trenches, sediment storage dams, and rock-fill dams. Biological conservation works mainly focused on area closure. Planting Sesbania, Leucenea, and Pigeon pea on bunds on farmlands has been successful.

Forage production has enabled farmers to make additional money from the sale of forage seeds to the woreda office of agriculture and NGOs. At the present time over 120 hectares of land is under closed area management in Yeku & Lenche Dima, AMAREW's two pilot watersheds. The closure at Yeku is now serving as an exemplary demonstration site for the Sekota Woreda. Farmers' days are often observed at Yeku to demonstrate the economic and environmental positive impacts of closed area management to farmers, administration representatives, development agents, government officials, and NGOs



Photo: AMAREW Project

BEFORE: Natural resources degradation is a common problem in the ANRS in general and the AMAREW pilot watersheds are no exception. Water erosion, which is a serious problem in the pilot watersheds, is mainly caused by the heavy run-off from the surrounding degraded hillsides. The pilot watersheds are also seasonally drought prone and afforestation programs have shown very low survival rate of tree seedlings. The fields are almost completely denuded and have little vegetation cover.



AFTER: The most encouraging and sustainable results we obtained are from natural resources conservation under community owned closed area management system where self-help user groups have been organized to manage degraded hillsides. Under this system, an area to be closed and managed was identified by the entire watershed community with the facilitation role of the Community Watershed Management Organization (CWMO). Farmers have started to observe that natural regeneration in the closure sites has allowed new emerging shrubs & grass species, which were not visible in the past. The extensive physical conservation works constructed by the communities in the closed areas have essentially curtailed the excessive run-off from the surrounding hillsides, resulting in increased infiltration and improved ground water recharge. The Yeku stream flow has now been extended up to four months. User groups get an additional annual income of 400 birr/member by selling grass alone.

2.1.7 Rope & Washer Pump Technology: A Supplement to the Water-Harvesting Schemes

In view of combating the persistent food insecurity situation that prevails in large parts of the Amhara Region, USAID/AMAREW supports local initiatives that deliver appropriate technologies for increasing crop production and productivity



In Tehuledere woreda the socio-economics and extension research team of Sirinka Research Center demonstrates the use of the rope and washer pump that delivers water efficiently and at low cost

The Amhara National Regional State (ANRS) government has been engaged in a massive campaign of construction of water harvesting structures to improve food security and income of smallholder farmers. Farmers have already started growing different fruits and vegetables through small-scale irrigation for their own consumption and the local market. However, if this initiative is not supported with a suitable water management and delivery system, the harvested water may not be accessible to satisfy the crop water demand. Using the hand carried bucket method of lifting water from the storage tank and applying it to plots leads to intensive labor use and excessive wastage of water.

To solve this problem, with AMAREW support, the Sirinka Agricultural Research Center of Amhara Regional Agricultural Research Institute (ARARI) developed the rope and the washer pump which is a promising technology to assist the regional water-harvesting program. The center carried out in Tehuledere woreda demonstration trials of the new pump technology on 21 households owning water harvesting structures and growing fruits and vegetables. More demonstration trials are also planned in other woredas. The growing popularity of this technology can be confirmed through the woreda offices of agriculture and rural development giving lots of purchase orders to local business to produce the pump in massive numbers. The Kalu woreda, for example, has ordered a total of 640 of such pumps for distribution in the woreda.

The rope and washer pump is simple to construct from locally available materials using local skill. It is also easy to operate, saves labor, and helps avoid wastage of water during lifting operations. The major components of the rope and washer pump are a long rope, preferably plastic, with a series of closely spaced circular rubber washers mounted on the rope at their centers. As the rope moves from the water storage tank through the inclined PVC pipe in the structure, each of the washers with about the same diameter as the pipe, takes up a certain quantity of water and discharges it in a trough at the upper end of the PVC pipe. The movement of the rope and washers upward through the pipe and back to the storage tank from outside the pipe is made possible by a grooved wheel cranked with a handle at the center, which in turn is mounted on a wooden frame above the ground.

2.1.8 Low-Cost Gravity Drip Irrigation: Assisting Water-Harvesting Schemes

USAID/AMAREW supports development that helps farmers combat low moisture stress in crop production, which is the primary production and productivity limiting factor, making over half of the Amhara Region food insecure



Photo: AMAREW Project

An encouraging result has been obtained from a low-cost gravity drip irrigation experiment carried in Adet Research Center. This appropriate technology development endeavor assisted by AMAREW has developed a drip irrigation system that overcomes the inhibitory cost factor of such systems. Its use by farmers will facilitate the shift of the production system from its focus on low value grain crops to high value commodity crops such as vegetables and fruits with good market attraction

Water harvesting schemes implemented in the Amhara Region are intended to contribute to improving the food security and household income of the rural population. Farmers have increasingly come to recognize the benefits from this technology, and the demand for more water harvesting efforts is coming from the rural communities. Due to the limited amount of stored water, the schemes must be supported with appropriate and efficient water application methods in order to realize the anticipated benefits.

Farmers normally apply water to their small plots of fruits and vegetables by manual flooding using hand carried buckets or similar watering containers. This method entails excessive loss of valuable water and may even be insufficient to cover the crop demand for a season. The use of the appropriate irrigation method would help solve some of these problems. One such method is drip irrigation, which is recognized for its applicability and water use efficiencies and saving of labor. However, the high initial cost mostly discourages smallholder farmers to invest in the system.

With the initiation and support of AMAREW, researchers at Sekota and Debre Berhan Agricultural Research Centers of ARARI have satisfactorily tested low-cost gravity drip irrigation. A graduate student under the supervision of AMAREW staff has also successfully carried out a field experiment of low-cost gravity drip irrigation using locally available scrap materials and confirmed that it has performance comparable to imported equipment. It is believed that the local people can easily reproduce the system components after receiving the necessary training. Farmers can increase their annual crop yield and income several times with the utilization of low cost gravity drip irrigation scheme.

2.1.9 *Striga* Resistant Sorghum Varieties: High Yields Under the Menace

USAID/AMAREW's strategy is supporting endeavors that target issues threatening the attainment of food



Photo: AMAREW Project

Striga hermonthica is one major threat to livelihoods of rural households in lowlands of Wollo as it devastates sorghum fields. With the AMAREW Project support, the Sirinka Research Center is continuously engaged in identifying striga resistant sorghum varieties that meet farms' needs. The endeavor enabled the release of varieties that revived rural households hopes of survival. Varieties such as Gobiye (depicted in the picture) are now widely grown in farmers' fields in Kobo-Girana valley, yielding well under the threat

Striga is a serious parasitic weed in the lowlands of Wollo limiting sorghum production, which is the major staple grain crop of lowlanders. The use of striga resistant cultivars as a component of an integrated striga management (ISM) strategy has been found promising. Gobiye, Abshir and Birhan are striga resistant sorghum cultivars released by the Sirinka Research Center for striga sick fields of Kobo and Sirinka areas. These improved varieties showed about three-fold yield (25-34 q/ha) in all the sites compared to the local check which, due to its susceptibility, may totally be wiped out by the parasitic weed. The increasing use of these new varieties could give additional yields of hundreds of thousands of quintals in the Kobo area alone. The ISM strategy included improved striga resistant cultivar, fertilizer application, and proper crop management practices.

Through a collaborative work between INTSORMIL, the Ethiopian Institute of Agricultural Research (EIAR) and AMAREW about 30 quintals of certified seed of the three striga resistant sorghum varieties were obtained from Purdue University (Prof. Gebissa Ejeta) for further seed multiplication and distribution in target woredas invaded by this scourge, including the Lenche Dima watershed which is one of the three AMAREW pilot watersheds. This is being done through Sirinka Research Center and the woreda agriculture offices. Thousands of farmers participated in an ISM program and doubled and tripled their sorghum yields compared to their fellow villagers who cultivated local sorghum varieties.

The introduction and rapid diffusion of striga resistant varieties is the most feasible option of survival strategy under striga threat in such resource poor rural economies whereby farmers operate under serious limitations of resource and thus could not opt for other control measures.

With the introduction of striga resistant varieties sorghum fields regained their value that they had lost to the weed and daily household bread appeared on the plate less from aid grain and more and more from what is produced the on-farm.

2.1.10 Farmer-Research-Extension Group (FREG): Strengthening Linkage

USAID/AMAREW's goal is to bring a paradigm shift in the research-extension (R-E) system whereby R-E linkage becomes a reality rather than being a



Photo: AMAREW Project

FREG members evaluating the performance of improved faba bean varieties in Lay Gayint woreda. Among the varieties obtained from research due to the already functional R-E linkage the seed of those that are selected by FREG members for meeting farmers' need will be multiplied under a community-based participatory seed multiplication scheme for their seed to reach farmers through the local seed supply system under different transaction arrangements

Agricultural research and extension in the Amhara Region has attempted to play its role in increasing and stabilizing agricultural productivity. An effective agricultural development, in general, and technology development and delivery system, in particular requires a good linkage mechanism particularly between research, extension and farmers.

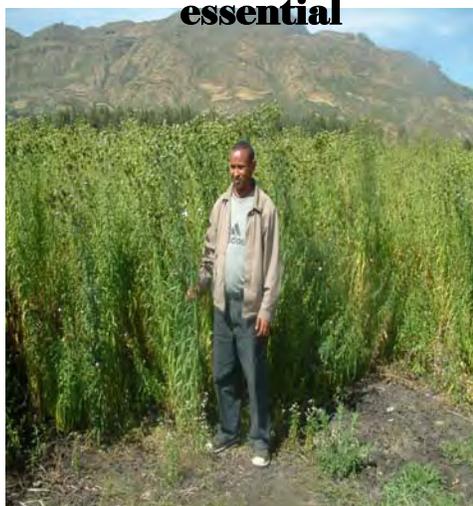
The research-extension services, however, have been criticized for two reasons: first, the research problems being investigated are generally not in accordance with the priority needs of farmers; second, the technologies and information generated by the research system have not been effectively transferred to the farmers. The major reason for these problems is the weak or ineffective linkage between research and extension functions.

In order to ensure the participation of stakeholders and strengthen the research-extension linkage, the Adet Research Center with the support of AMAREW Project introduced the concept of Farmer-Research-Extension Group (FREG) in two pilot Kebeles (Gobgob and Yedora) in Lay Gayint woreda. FREG serves as a mechanism for research-extension linkage in technology development and transfer.

The two FREGs in the pilot Kebeles have been involved in the technology adaptation, demonstration and multiplication of improved crop varieties such as potatoes, faba bean, barley and some others. The FREG members, comprised of 20-25 farmers both male and female and meet at critical times in the season to evaluate, using their own criteria, the performance of the on-farm trials in the presence of both researchers and extension workers. This has enabled the research-extension system obtain feed back on the technologies being demonstrated and allowed projection of the extent of adoption and potential impact of the improved crop varieties in increasing production and productivity in the growing area, which is the goal of AMAREW project. It is believed that the FREGs could also serve in the long run as nucleus for establishing community based seed production cooperatives in the woreda(s) to work towards addressing the unsatisfied improved seed demand of various crops.

2.1.11 *Vernonia*: A Promising Industrial Oil Crop

USAID/AMAREW understands the limited opportunity for the rural economy to develop under the dominance of low value cereal-based systems, which do not allow market integration, hence a shift towards high value commodity crops is essential



Market-led rural economy development is highly desired and is the leading agricultural development policy moto in the Amahar Region. This could be achieved if the low value cereal based production system is assisted to include high value crops with market attraction. Such potentials are found in new crops such as Vernonia, an industrial value oil crop receiving research-extension attention interms of variety development, seed increase, and market search through the support of AMAREW. Intensive tests are being carried out in the region, which revealed high yield levels of the crop

Vernonia galamensis (a potential industrial oilseed crop) but an indigenous weed in Ethiopia has a potential for export market. As widely documented in the literature, seeds from this plant contain oil rich in epoxy fatty acids and used in plasticizers and additives in flexible polyvinyl chloride (PVC) resins. Additional market potential might be as a drying agent in reformulated oil-based or alkyd-resin paints. Other potential uses for the oil include paint additives, polymers, and plastic additives. In consideration of the potential market, in the United States, for example, over 63 million kg of epoxy compounds are used in coatings and adhesives alone annually. In the area of commercialization of the crop, some essential steps have been taken by the Ethiopian Government to attract foreign investors/business firms for commercial production of *Vernonia* oilseed. As an example, a British firm has indicated an interest in purchasing large quantities of *Vernonia* oil.

The Adet Research Center of Amhara Regional Agricultural Research Institute (ARARI) is actively engaged in *Vernonia* research and has released one high yielding *Vernonia* variety (AD7104). The AMAREW Project assists ARARI in strengthening national and international collaboration. For enriching the germplasm base of the crop, AMAREW obtained from Alemaya University 217 germplasm accessions collected from different parts of Ethiopia and delivered them to the ARC for characterization and selection. Currently, ARC is engaged in *Vernonia* agronomic and germplasm evaluation as well as large-scale seed multiplication at its various sites.

AMAREW is facilitating *Vernonia* potential market linkage between US companies and Amhara Region producers through Virginia State University (VSU). One U.S. Company, VSU is linking with is now doing intensive research on the utilization of vernolic acid for various industrial uses. In Ethiopia, there is still the need to intensify research efforts on this crop for both quantity and quality of oil & open up opportunities for the country to exploit the export market. The concern of many of the U.S. companies such as this one with interest on *Vernonia* is the fear of not having a steady supply of *Vernonia* oil year round, which apparently has hindered its large-scale utilization. We believe the issue of sustainable and reliable production and supply of the crop at the required quantities can be handled through diversification in space & time of production. ANRS entities can also manage to increase production through contractual arrangements with local farmers in an out-growers scheme. AMAREW serves as an effective liaison between market in the U.S. and research and production efforts in Ethiopia.

2.1.12 Long-term Training Motivates Experienced Staff Stay on the Job

USAID/AMAREW human capacity building strategy encompasses long-term degree training of researchers and development workers to enhance their knowledge and skill to lead a coordinated, visionary and effective research-extension endeavors



Photo: AMAREW Project

These are development workers who earlier had the typical mid-career feeling of stagnation due to lack of self-development opportunities in the remote places they were assigned to work. With the support of AMAREW, 31 such workers are pursuing their higher degree studies as these ones studying in Mekelle University who were visited by a team of AMAREW staff in August, 2005

Frequent staff turnover in search of city jobs or better-paid employment opportunities is one of the developmental bottlenecks in the Amhara National Regional State (ANRS). This is particularly exacerbated within the Bureau of Agriculture and Rural Development (BoARD) and the Amhara Regional Agricultural Research Institute (ARARI), major partners of the Amhara Micro-enterprise, Agricultural Research, Extension and Watershed management (AMAREW) Project. Both ARARI and BoARD naturally place their Research-Extension (R-E) workers in remote and sometimes difficult to access locations. Working for these institutions in remotely situated woredas is becoming increasingly unattractive. Retaining staff in remote areas such as Sekota and East Belessa that have limited or no service provision has been and continues to be difficult.

As a result, none of such remotely situated woredas have anywhere near adequate number of professionals with the necessary education, experience and even motivation to lead a coordinated, visionary and effective research-extension program.

In the absence of any motivating incentive, tolerance levels and empathy for rural life is minimal and experienced staff continually depart from such assignments. With the intention of rectifying the situation and enhancing the competence of development workers, the AMAREW Project has included a long-term degree-training program as part and parcel of its capacity building effort for ARARI and BoARD. In this program, best performing R-E workers with good academic records were encouraged with technical and financial Project assistance to work towards a higher degree. Consequently, the AMAREW Project sponsored 23 BS and 8 MS aspiring development workers recruited from six remotely situated woredas and research centers. The trainees were placed in local universities such as Mekelle and Alemaya.

The hypothesis was correct in that the intervention, beyond serving as an incentive for experienced staff to remain on duty, has improved their ability to do more effective work in their respective areas of responsibility or to prepare them for new assignments. None of the trainees has quit their job. The intention and hope of both ARARI and BoARD is that all the trainees will stay satisfied on the job for extended period of time.

2.1.13 Inductive Training for the Novice Research Worker Enhances Competence and Promotes Swift Integration into the Research System

USAID/AMAREW believes that incipient research workers can only be technically empowered if their university education is supplemented by an



Photo: AMAREW Project

For fresh university graduates who decided to pursue their career in Research-Extension like this one it has always proved difficult to come on board of the research system competently and with confidence without receiving an inductive training because in their initial after school years they still lack competence in a number of areas

In the best of the cases, newly recruited research staff may have technical knowledge, but often lack experience and confidence to develop and conduct an effective research program. Cognizant of this deficiency, ARARI and AMAREW jointly organized a one-month long module based inductive training in 2005. The trainees were 45 junior agricultural research workers recruited by ARARI and assigned to its seven research centers.

Experienced and knowledgeable resource persons were drawn from the Ethiopian Agricultural Research Organization (EARO), the International Food Policy Research Institute (IFPRI), the Swedish International Development Agency (SIDA), ARARI, and AMAREW to offer training courses on topics under the following thematic areas:

- Problem and opportunity diagnosis and research planning because the incipient researchers must learn to identify significant problems in their respective fields that limit production;
- Ability to work in an interdisciplinary team as this is an aspect of agricultural research that receives little attention during University training;
- Research methods and experimentation in crop, livestock, natural resources, and socio-economics/extension;
- Research proposal and scientific paper writing with emphasis on choosing appropriate experimental designs;
- Overall orientation to the Ethiopian agricultural research system, including Government policy on research, review of research status in specific disciplines, prevailing research gaps, and sources of secondary information.

The program also aimed to create a culture in which all newly recruited staff are inducted into the research system, the research commodity programs they are to join, the requirements of the new job, and the new roles they are expected to play in moving from school to employment.

A post training evaluation done by ARARI and AMAREW showed that the trainees had gained confidence and a better understanding on research problem identification, preparation and evaluation of research proposals, designing and implementation of field experiments. The trainees themselves expressed a high level of satisfaction about the relevance and quality of the training they received.

2.1.14 Experience Sharing Tours are useful for Technological Idea Shopping

USAID/AMAREW supports in-country and overseas educational tours as a strategy for technology idea shopping that technically empowers research and extension personnel



Photo: AMAREW Project

Azolla, a delicate little weed is a great nitrogen fixer that also stops mosquitos from inhabiting flooded areas. It fixes up to 90 kg N/ha that is an opportunity for emerging rice producing resource poor farm households as they lack readily available cash to buy artificial fertilizer. This is the main reason for the agronomy research team in Adet Research Center to engage in on-farm performance testing as seen on the picture using a specimen brought from India during an AMAREW supported educational tour in 2003

Since the start of the AMAREW Project, researchers from ARARI and extension workers from BoARD, local partner institutions of AMAREW Project, are being offered both in county and overseas experience sharing tours financed by the project. This has been done with multiple aims including assessing adaptable technologies and new ideas from elsewhere, seeking mechanisms of successful technology transfer systems, and linking with relevant technology sources for future shopping of technologies and ideas.

Two years ago, a team of 11 researchers in different fields and four professionals from BoARD went to India for a couple of weeks where they visited various research and development institutes in Dehradun, Hyderabad, Bhopal, and Mumbai. The team brought back sketches and specimen for several useful technologies that could be modified and multiplied locally. The crop research team brought specimen of Azola, a bio-fertilizer technology potentially useful in the emerging rice production systems, seeds of horse gram, a high potential crop for drought prone areas, and seeds of various spices and herbs that are high value commodities for the market-led regional economic development. Currently, all these technologies are being tested at advanced stages.

The agricultural mechanization research team also brought back technical drawings and ideas on several farm machinery including single animal drawn plow and harrow, manual raw planter and cultivator, hand-held single-ear maize sheller, pedal driven grain thresher, and seed cleaner. The technical drawings have already been converted into technological realities by the Bahir Dar Rural Technology Center, the mechanization research wing of ARARI, which has developed a prototype for each of the tools and machineries mentioned above.

Mr. Asmamaw Endebhlatu, a researcher at the Farm Mechanization Center, who was part of the team, said “If all these technologies were to be purchased from abroad in significant quantities, it would cost the country an exorbitant amount of money, whereas we are able to develop prototypes just by bringing back ideas for a small amount of money spent”. Dr. Enyew Adgo, the Natural Resource Research Director of ARARI who was the visiting group leader, has also commented “*the small amount of money spent on sending the team overseas for technology shopping and educational tours was money worth spent, because the team returned with minds full of what is to be done next, and that is being seen now*”. This, he said, “*is an innovative support to the regional research system by AMAREW*”.

2.2 Project-wide Significant Problems Encountered and Solutions

- Delay in project budget release at the USAID level at the beginning and the various levels involved in the ANRS in transferring the funds to the Project implementing sites were critical impediments during the year. With the acceptance of the fund release milestones this problem should be resolved in the future.
- The unavailability of account numbers, earlier in the year, at each woreda, specifically dedicated to AMAREW Project delayed fund transfer from the FSPCDPO to the target WOARDs. Later in the year all woredas did open accounts dedicated to the AMAREW Project.
- The single pool financial system instituted by the ANRS government at the woreda level was found to be an impediment on procurement and timely distribution of inputs. There are signs that some positive changes will be made regarding this problem.
- The delayed rate of project fund utilization by our ANRS affected negatively the timely implementation of project activities. Most woredas are now on track to use project funds on time and as planned. Project staff continues to monitor the situation and advise implementers to make improvements with this regard.
- High staff turnover during the year both at the WOARD and the Research Center levels had negative consequences for efficient and timely implementation of planned Project activities. The Project's training and mentoring opportunities are helping to minimize this problem.
- Focal persons responsible for project work plan implementation have been changing too frequently, thereby making it difficult to follow up and ensure implementation of the planned activities. We continue to discuss with WOARD officials to stabilize this situation.
- During most of the year, project implementers at WOARD and farmers levels were fully occupied with too many government-organized meetings and election related activities, sparing little time for project work plan implementation. By the end of the year, with the official meetings reduced and the election activities over, implementers appeared to have more time for project activities.
- At the AMAREW staffing level, the Extension Advisor (Dr. Habtemariam Kassa) and the Training Advisor / FtF Coordinator (Dr. Elias Zerfu) resigned during the year. The positions were advertised nationally and subsequently Ato Yacob Ashine and Dr. Eshetu Mulatu were hired as the Extension Advisor and Training Advisor / FtF Coordinator, respectively.

3. Research Component

3.1 Introduction

On-farm research and related activities have been underway in the target woredas implemented by five ARARI research centers, namely, Adet, Sirinka, Sekota, Debre Berhan, and Gondar with the support of USAID/AMAREW. Despite some unforeseen circumstances that hindered the smooth running of the on-farm research programs, the support given by USAID/AMAREW has been effectively used in the implementation of the planned activities under ARARI.

3.2 Objectives of the on-farm research support

The restructured AMAREW project is designed to contribute to attaining USAID's strategic objective, SO 16, and specifically, Intermediate Result, IR3, which aims at improving agricultural productivity and natural resources management, and ensuring food security of the rural household in the targeted woredas of ANRS. The adoption of new technologies and improved agricultural practices which AMAREW promotes assist in the realization of USAID's strategic objective. At the project level, integration of the different components of AMAREW, namely, on-farm research, extension, and watershed management has been underway in the project's pilot woredas and the pilot watersheds.

In its on-farm research support to ARARI AMAREW emphasizes the following major activity areas:

- Assistance to on-farm research in the project's pilot woredas, both low and high potential;
- Upgrading researchers' skills through short- and long-term trainings.

The project has also attempted to improve the research facilities of ARARI particularly in the tissue culture techniques for rapid and clean seed/planting material multiplication of potato and other crops.

3.3 Target woredas of on-farm research

The targeted areas for on-farm research in 2005 are shown in Table 2. As shown in Table 2, the research support provided by AMAREW in 2005 covered five zones of ANRS with a total of seven targeted woredas, and five additional woredas in North Showa for on-going trials carried over from previous planning years. Ankober and Ensarona-Wayu are high potential woredas with the remaining being low potential or drought-prone woredas. The two established pilot watersheds (Yeku and Lenche Dima) were also included for intervention with on-farm research. However, it was reported by Sirinka Research Center that some kebeles in Gubalafto woreda (Amaye Mecha and Gebere Amba) could not be

adequately addressed as planned due to poor access by motor vehicles during the rainy season because of frequent river flooding:

Table 2. Targeted woredas of USAID/AMAREW-supported on-farm research

Zone	Targeted woredas	Responsible Research Center
Wag Hamra	Sekota and Yeku watershed	Sekota
North Wollo	Gubalafto and Lenche Dima watershed	Sirinka
	Tehuledere	Sirinka
South Gondar	Lay Gayint	Adet
North Gondar	East Belessa	Gondar
North Showa	Ankober, Ensarona-wayu, Gera Keya, Efratana Gidem, Kewet, Lalomama	Debre Berhan

3.4 Major activities planned by the research component for 2005

- Monitoring and evaluation of the implementation of on-farm trials by research centers in the target woredas;
- Giving training on natural resources management research for ARARI researchers as part of the Inductive Training;
- Following up the implementation and progress of research projects under the Small Grant & Mentorship Program (SGMP) of AMAREW project;
- Encouraging and assisting researchers in the formulation of new research proposals;
- Participating in annual research review meetings at center and regional levels;
- Continuing strengthening the research-extension linkage in target woredas and making preparation to organize a regional workshop to address the issue;
- Continuing the preparation and publication of a “Guideline Document on Water Management Research Methods”, which has been identified as one of the gaps of the natural resources research program;
- Participating and present papers at workshops organized in the region on agricultural and natural resources management issues;
- Compiling quarterly and annual progress reports.

3.5 Accomplished Activities

3.5.1 All centers

The implementation of USAID/AMAREW-supported on-farm research projects planned by the research centers has been successfully implemented during the year at a number of sites in the target woredas (Table 3). The trials were adaptive types focusing on pre-extension demonstration of improved technologies on crops,

livestock, and natural resources management under farmers' conditions. The pre-extensions trials were farmer-managed where the participation of farmers and extension agents was essential.

The key activities common to all centers during the year were the formulation of relevant and high priority new research projects, presentation for review of the projects (new, on-going and completed) at center and regional levels, implementation of planned activities (selection of farmers or trial sites with woreda extension staff, layout of trial plots, planting, thinning, weeding and other cultural practices) followed by collection of data, and organizing farmer field days in collaboration with woreda extension agents and farmers. Preparation and submission of quarterly reports with the assistance of AMAREW was also the responsibility of the centers.

Among the planned pre-extension demonstration trials of Sirinka Research Center on haricot bean in Tehuledere and Gubalafto, as well as the farmer based seed production of the Huruta shallot variety in Gubalafto were not implemented due to seed shortage. Two trials on on-farm screening of tree species and on-farm evaluation of the *Acacia polycantha* for farm forestry were similarly not realized due to staff turn over. The center, however, conducted in the season one additional trial, namely, management of *Parthenium hysterophorus* through intercropping sorghum with legume in the Lenche Dima watershed.

Table 3. Number of USAID/AMAREW-supported on-farm research trials, planned versus achieved across centers, in 2005

No	Research Center / Category	Planned	Achieved	
			Number	%
1	<i>Adet Research Center</i>			
1.1	Crops	13	13	100
1.2	Livestock	-	-	-
1.3	Natural Resources	-	-	-
1.4	Socio-economics	6	6	100
2	<i>Sirinka Research Center</i>			
2.1	Crops	9	9	100
2.2	Livestock	2	2	100
2.3	Natural Resources	5	2	40
2.4	Socio-economics	11	10	91
3	<i>Sekota Research Center</i>			
3.1	Crops	10	10	100
3.2	Livestock	11	11	100
3.3	Natural Resources	9	7	78
3.4	Socio-economics	4	4	100
4	<i>Debre Berhan Research Center</i>			
4.1	Crops	3	3	100
4.2	Livestock	3	3	100
4.3	Natural Resources	3	3	100
4.4	Socio-economics	6	6	100
5	<i>Gondar Research Center</i>			
5.1	Crops	10	8	80
5.2	Natural Resources	2	2	100
	Total	107	99	93

3.5.2 Highlights of selected completed on-farm research activities

3.5.2.1 Adet Research Center

i) Demonstration and seed multiplication of improved crop varieties (Potato, barley, faba bean, and bread wheat)

Barley, wheat and faba bean are among the major crops in Lay Gayint and Simada woredas. Based on the farming system survey, the average yields of barley, wheat, and faba bean were 5.1, 6.6 and 3.2 qt/ha in Lay Gayint, and 6.2, 9.0, and 5.0 qt/ha in Simada, respectively. The low productivity of the crops in these woredas is mainly due to lack of awareness by farmers about improved varieties and inputs and recommended agronomic practices.

To address this problem, Adet Research Center conducted adaptation trials, followed by on-farm evaluation and demonstration of improved food barley, bread wheat, and faba bean varieties in the two woredas in the 2005 cropping season. The demonstrations included improved varieties, local checks, and recommended agronomic management practices.

Based on the results of on-farm demonstration and farmers' assessment, improved food barley varieties, Shedeho (13.8 qt/ha) and Setegn (13.7 qt/ha) for Simada; and Mulu (35 qt/ha) and Shedeho (32.7 qt/ha) for Lay Gayint; improved faba bean varieties, Degega (26.0 qt/ha) and CS-20-DK (25.3 qt/ha) for Lay Gayint woreda were selected.

In addition, five improved bread wheat varieties (HAR 2536, HAR 2029, HAR 1775, HAR 1685, and HAR 604) that gave high yields in the range of 28.5-35qt/ha are recommended for Simada woreda. HAR 1685, HAR 604, and HAR 1868, which gave yields in the range of 31.0-33.7 qt/ha are selected for Lay Gayint woreda. This activity was conducted with the aim of increasing the diversity of bread wheat varieties in the woreda. The Guder Agro Industry in the region has been also interested in these varieties for their good bread making quality and has started negotiating with farmers' cooperatives in the region. Adet Research Center has brought the different stakeholders (Cooperatives Bureau, BoARD and Guder Agro industry) together for production of these improved bread wheat varieties by farmers.

Adet Research Center has extensively used Farmer-Research-Extension Groups (FREGs) in the conduct of demonstration trials and seed multiplication of several improved crop varieties in Lay Gayint and Simada woredas. The FREGs established in Lay Gayint are at Gobgob and Yedora kebeles in collaboration with the woreda extension service on improved crop varieties of potato, faba bean, barley, wheat, and linseed (Table 4). A FREG consists of 20-25 farmer members including female farmers and serves as forum for research-extension linkage in technology development and transfer. It ensures the full participation of farmers in the conduct and evaluation of on farm trials. The trials are used for demonstration and seed multiplication of the improved varieties (Figure 1 and 2).

Adet Research Center has, during the year, organized FREG meetings at Gobgob and Yedoro to evaluate the performance of the improved crop technologies. Farmers' evaluation using their own criteria was positive for all the improved crop varieties in terms of stand establishment earliness, and visual yield potential as compared to the local varieties. After comparing farmers' selected varieties with the actual yield, seed multiplication of the selected varieties were also conducted on 89 selected farmers' fields (0.1ha each) for wider dissemination through farmer-to-farmer seed exchange mechanism. The center has also been engaged in assisting farmers in the constructing diffuse light storage (dls) structures for potato tubers, which otherwise are easily perishable, on the premises of those farmers carrying out the potato trials.

Table 4. Improved crop varieties and FREG members implementing the trials

Crop type	Improved variety(ies) (Trials include also local varieties as checks)	Number of FREG members involved by location		Type of activity
		Gobgob	Yedoro	
Potato	Tolcha	1	1	Seed multiplication
Faba bean	CS-20-DK, Degaga, Messay	5	10	Seed multiplication
Food barley	Shedeho, Mulu, Setegn	6	5	Seed multiplication
Wheat	HAR 1868, 604, 1685, 1775, 2029, 2536	10	15	Seed multiplication
Linseed	Geregera, CI-1525, Berene	1	2	Demonstration
Total		23	33	



Fig. 1. FREG members of Lay Gayint observing improved potato variety (Tolcha)



Fig. 2. Improved faba bean variety (CS-20-DK) plot being observed by FREG members of Lay Gayint

ii) Participatory seed multiplication

Adet Research Center was also engaged in participatory seed multiplication and dissemination of seeds of improved crop varieties through cooperatives and high school students in Lay Gayint and Simada woredas with the objectives to introduce improved crop technologies to the farming communities and to identify effective

disseminators of the technologies. In this regard, improved food barley variety (Abay) and faba bean (CS-20-DK) were given to three farmers who are cooperatives members and to three high school students in each woreda for multiplication in the 2005 season. The center has collected data on the diffusion of the varieties.

iii) Response of Triticale to nitrogen and phosphorus fertilizer

Triticale is a man made crop resulting from crossing rye and wheat that combines the positive traits of both parents, the deep rooting ability and drought hardiness of rye and the high yield potential of wheat. In comparison to wheat and barley, triticale performs well in marginal and degraded areas of the ANRS highlands. It has high tolerance to drought, frost, hail, and diseases, prevalent in the ANRS. The crop has attracted the interests of ANRS farmers and is credited to contribute to the Food Security Program of the region. Farmers can reuse the seed as long as it is kept pure and free from mixtures.

The Adet center released earlier two varieties of Triticale, Minet for high rainfall areas and Sinan for drought prone areas. Fertilizer trials on triticale were conducted in Lay Gayint woreda on three farmers' fields. The result shows that triticale has significant response to nitrogen and phosphorus fertilizers. The highest grain yield (38.2 qt/ha) was obtained on a fertilizer rate of 92/46 kg N/P₂O₅ ha⁻¹. This is a yield increase of 107% over the unfertilized check plot (18.4 qt/ha).

iv) Determination of seed rate on two released triticale varieties in Lay Gayint

In a trial conducted in Lay Gayint woreda, a significant response of triticale varieties to different seed rates was observed. The two varieties (Sinan and Minet) showed similar responses to different seed rates. Generally, the highest grain yield (34.0 qt/ha) was obtained on the highest seed rate (125 kg/ha). The two varieties were significantly different in grain yield where the Minet variety showed a yield advantage of 6% over Sinan.

v) Effect of N and P levels on the grain quality and yield of malting barley

Malt barley has a domestic market potential and import substitution. For example, the Dashen Brewery in the region had indicated a long-standing interest of collaboration with the Adet Research Center on the improvement of the malt quality and yield of malt barley. To that effect, the center conducted a trial in Lay Gayint woreda on the effect of fertilizer on the malting quality of barley. An increase of grain yield was obtained in response to both nitrogen and phosphorus. The highest yield was 18 qt/ha with the application of 60/30 kg N/P₂O₅ ha⁻¹. There was a yield increase of 67% over the unfertilized plot (10.8 qt/ha). At the highest nitrogen rate, the malting quality of the grain was even maintained at the acceptable level in protein percentage (9.19%), which, however, needs further investigation on the interactions of variety and nitrogen fertilizer rate on the quality of malt barley grain.

vi) Investigation of rates of closed area regeneration with and without water harvesting

The research project has been conducted by the center for the last three

years. It is reported that closure immediately after burning without water harvesting and enrichment planting showed a better potential to encourage the revegetation of tree/shrub or grass/herb species. This was assumed to be due to breakdown of dormancy of seeds of the species by heat. Closure with water harvesting but without enrichment and closure without water harvesting but with enrichment showed a comparative economic advantage in biomass production. *Tingit, Embacho and Kitkita* were the most dominant tree/shrub species in the closed area, while *Gaja, Serdo* and *Senbelet* were among the prevalent grass species.

In general, area closure is a quick and cost effective method to rehabilitate marginal and unproductive land. It provides farmers the economic opportunity through selling grass for animal feed and material for roof thatching. The integration of water harvesting techniques (trenches) besides collecting runoff also reduces soil erosion.

vii) Evaluation of different water harvesting techniques in improving the survival rate of tree seedlings in Simada woreda

Eye-brow, micro-basin and trench were the water harvesting techniques and *A. saligna, C. macrostachyus, and C. africana* were the tree species used for the study. Generally, the plots with different water harvesting techniques gave satisfactory results compared to those plots on which no such techniques were employed. The survival rate of the *A. saligna* was 91%, 78%, and 62% on eye-brow, micro-basin and trench, respectively. On the plots without water harvesting technique (the control) the tree survival rate was only 28%. *C. macrostachyus* performed well in the trenches with a survival rate of 48%, 44% on micro-basin and eye-brow, respectively. On the other hand, *C. africana* did not show a significant increase in the survival rate with 11% 2% and 2% on trench, micro-basin and eye-brow, respectively.

It can be concluded from this that water harvesting is the best option for the growth and increasing the survival rate of tree seedlings in drought affected and moisture deficit areas such as Simada woreda.

3.5.2.2 Sirinka Research Center

Sirinka Research Center has been running a number of pre-extension demonstration trials on cotton (Delta Pin and Cu-okra), sesame (Adi), groundnut (Sedi) and sorghum (Awari) in and around Lenche Dima watershed and in Gubalafto woreda (Birhan variety). The early maturing sorghum varieties (Yeju and Teshale) were also demonstrated in Lenche Dima watershed.

i) Pre-extension demonstration of improved and striga resistant sorghum varieties

Striga is a parasitic weed attacking cereal crops in the lowlands of western Amhara, particularly, North Wollo. Birhan, which is a striga resistant sorghum variety, was demonstrated by the center for farmers and extension agents in the striga sick plot areas such as Kobo and Sirinka. It has demonstrated three-fold quality in all the sites demonstrated, resistant to striga, higher yield, and excellent fodder quality compared

to the standard check entry, Wedeaker. Birhan gave an average yield of 34 qt/ha compared to the check variety. These merits have made Birhan highly demanded by farmers in the area.

ii) Pre-extension demonstration of early maturing sorghum varieties Yeju and Teshale in the lowlands of Wollo

In another on-farm research in Lenche Dima watershed, and in Kobo, Mersa, Sirinka, Girana and Cheffa, the center conducted pre-extension demonstration of early maturing sorghum varieties, Yeju and Teshale with the recommended production package. The research was aimed at addressing the moisture shortage problem and early cessation of rainfalls in the area with the testing and demonstration of early maturing sorghum varieties. For all the sites, Yeju and Teshale gave an average yield of 32.5 and 36 qt/ha, respectively, with a 25-39% and 9-21% yield increase over the local variety with farmers' management. The first year demonstration created an incredible demand for seed of the variety by the farmers. Several field days were conducted to create awareness of the technology to copy and follower farmers. Many farmers preferred Teshale and Yeju for its yield compared to the local variety. However, farmers showed some resistance to plant Yeju for the coming years because of its perceived susceptibility to bird damage. Besides, Yeju matures too early compared to the local, hence is liable to bird attack.

Evaluation of the varieties indicated that farmers have great interest in cultivating Teshale for its higher yield advantage than the local, relatively long stalks and resistance to bird attack. Thus aggressive extension of the variety is recommended.

iii) Pre-extension demonstration of groundnut variety (Shulamith)

Currently groundnut is amongst the most expensive crops in the area. For instance, a quintal of groundnut costs 750-850 Birr in the local market of Woldiya town. Improved groundnut variety, Shulamith, was demonstrated in Lenche Dima watershed. The local variety "Alamate" is susceptible to disease. In the intervention area, groundnut cultivation was not known much in the past.

Shulamith variety, with a yield of 35 qt/ha, gave a yield advantage of 24% over the local variety. Farmers have liked Shulamith for its resistance to disease and the large seed size. This has created a renewed interest on groundnut cultivation in Gubalafto woreda.

iv) Pre-extension demonstration of cowpea varieties on farmers' fields

The demonstration of cowpea varieties, Asrat and Bekur, was conducted in three areas: Kobo, Mersa and Cheffa for two years. The results showed that the improved variety Asrat has an outstanding performance compared to the locals in almost all the areas. Asrat showed a mean yield increase of 24% over the local variety in Kobo in two years of trial. In Cheffa and Mersa, the variety showed yield advantage of 24 and 18%, respectively.

After giving training on the utilization of cowpea, many farmers in North and South Wollo were given seed of Asrat and Bekur cowpea varieties. Many host farmers appreciated these varieties for their taste and sauce making qualities.

v) Evaluation of different oat/vetch mixtures for their biomass yield in the highlands of Wollo

The study was conducted in Delanta Dawint woreda. The compatibility of 10 oat/vetch mixtures and plant height at harvest of oats and vetches in the mixtures was tested for two years. Highly significant difference was observed on height at harvest for the vetch species, which ranged from 79cm to 95cm with the overall mean of 87cm. From the evaluated vetch species, *Vicia villosa* was consistently compatible and hence taller than *Vicia atropurpurea* in each mixture. *Vicia villosa* gave also significantly higher dry matter forage yield in each mixture than *Vicia atropurpurea*. Jassari and CI-8251 with *Vicia villosa* gave dry matter yield of 8 qt/ha. These mixtures with *Vicia villosa* are recommended and should be promoted in the area for improving feed availability both in terms of quantity and quality and maintenance of soil fertility, which are the major problems of the farming system.

vi) Rope & washer pump technology: assisting water-harvesting schemes

The ANRS regional government has been engaged in a massive campaign of construction of water harvesting structures in order to improve food security and income of the smallholder farmers. Farmers have started growing different fruit and vegetable crops for consumption and local market. However, if this initiative is not supported with suitable water management practices, the harvested water may not be useful to meet the crop water demand. Using the simple bucket and carry method of lifting of water from storage and application to plots leads to excessive wastage of water and labor.

The rope and washer pump is a promising technology that has been developed by the Sirinka Research Center to assist the regional water-harvesting program in the different woredas. The center carried out in Tehuledere woreda demonstration trials of the new pump technology on 21 households owning water harvesting structures and growing fruits and vegetables. More demonstration trials are also planned in other woredas. It was observed that other woreda offices of agriculture and rural development have given orders to local business men to reproduce the technology in large numbers. For example the Kalu woreda has ordered a total of 640 of such pumps for distribution in the woreda.

The rope and washer pump is simple to construct from locally available materials and using local skill. It is easy to operate, saves labor and helps avoid wastage of water during lifting operations. The major component of a rope and washer pump is a long rope, preferably plastic, with a series of closely spaced circular rubber washers mounted on the rope at their centers. As the rope moves from water storage through inclined PVC pipe in the structure, each of the washers with about the same diameter as the pipe, takes up a certain quantity of water and discharges it in a trough at the upper end of the PVC pipe. The movement of the rope and washers upward through

the pipe and back to the storage from outside the pipe is made possible by a grooved wheel cranked with a handle at the center, which in turn is mounted on a wooden frame above the ground (Figure 3).



Figure 3. Demonstration of rope and washer pump in Tehuldere woreda

3.5.2.3 Debre Berhan Research Center

Debre Berhan Research Center has been engaged with USAID-AMAREW support in on-going on-farm trials in the low potential woredas (Gera Keya, Lalomama, Kewet, and Efratana Gidem) and new trials in the high potential woredas (Ankober and Ensarona-Wayu). The trials conducted by the center in these woredas are, among others, adaptation trials of tef, sorghum, bread wheat, food barley, and potato varieties, as well as on-farm demonstration of improved wheat, lentil, chickpea, faba bean, and potato varieties with their production packages. Research work was also undertaken on sheep disease and management, and in natural resources management.

i) Tef variety adaptation trial

Tef varieties adaptation trial conducted in mid-altitude areas of Efratana Gidem woreda (at Lay Saramba and Mehal Menz) revealed that grain yield showed significant difference among varieties included in the trial. The variety, DZ-01-1285, gave higher yield (16 qt/ha) than the local check (15 qt/ha). The relatively good performance of this variety was also confirmed by farmers' evaluation of the varieties at maturity.

ii) Sorghum variety adaptation trial

Assessment of early maturing sorghum varieties (Meko and Teshale) and striga resistant varieties (Gobyie, Abshir and Birhan) including the local varieties as local checks was conducted at two locations in Efratana Gidem woreda for two years. The early maturing sorghum varieties showed good performance compared to the local check in both locations for their early maturity. Meko gave 22 qt/ha and Teshale 19 qt/ha while the local variety gave 19 qt/ha. These improved varieties are recommended for areas where early maturity is desired.

The striga resistant sorghum varieties also performed well in both locations compared to the local variety. Birhan, Abshir, and Gobiye gave 26 qt/ha, 17 qt/ha, and 21 qt/ha, respectively, while the local gave yield in the order of 19 qt/ha. Moreover, Abshir and Gobiye have white seed color, which is preferred for home consumption and market. Observation showed that Birhan gave higher yield and is relatively earlier maturing and than the other varieties, a primary criterion in areas where unreliable rainfall and striga weed problems prevail.

iii) Bread wheat adaptation trial

Bread wheat adaptation trial was conducted in the highlands of Gera Keya woreda. Data analysis showed that varieties HAR 1868 and HAR 1899, with a yield of 28 qt/ha and 27 qt/ha, gave 44% and 44% grain yield advantage, over the local check. These two varieties were thus found adapted to the area and are recommended for commercial production in Gera Keya.

iv) Evaluation of different water harvesting techniques to improve survival rate of tree seedlings

The study was conducted at Showa Robit and Gumer. The two locations are very different in their environment and extent of natural resources degradation making comparison not possible. Hence, the types of trees planted were also different; *Acacia nilotica* for Showa Robit and *Acacia albedea* for Gumer mid-highland areas. The survival rate, height and collar diameter were very poor in the case of farmers' conventional tree planting pit (control) for both sites.

In general, for the mid-highland areas of Gumer eye-brow type of water harvesting technique was found better in providing tree seedlings high survival rate and growth condition compared to the other techniques. In the case of moisture-stressed degraded hills of the lowlands of Showa Robit, the collection trench and half-moon or micro-basin water harvesting techniques are recommended for tree seedling plantation of the woreda extension program.

v) Demonstration of potato varieties with their production package

Pre-extension demonstration of improved potato varieties (Gera and Gorebella) were conducted on 22 farmers' fields and where about 300 farmers actively participated in field days in Gera Keya, Lalomama and Efratana Gidem woredas following the potato adaptation trials. The average tuber yield of Gorebella variety with its production package (spacing, fertilizer rate, and cultivation practice) for all locations was 282 qt/ha, while that of Gera was 265 qt/ha. Farmers are now in great need of seeds of these potato varieties; the center is making efforts to produce quality seeds to address the seed shortage in the areas.

vi) Demonstration of improved faba bean varieties with its production package

Though faba bean is widely grown in North Showa, its production has been constrained by such limiting factors as root rot, aphids and frost. To that effect, the center released two root rot resistant and high yielding varieties, namely, Lalo and

Dagem. Following this, pre-extension demonstrations of these varieties were conducted on 20 farmers' fields and with the participation of about 200 farmers in field days around Molale and Mehal Meda areas of Lalomama and Gera Keya woredas, respectively. The mean yields of faba bean obtained from Lalo and Dagem were 24 and 22 qt/ha, respectively, while the local variety with improved agronomic practice gave only 17 qt/ha.

vii) On-farm supplementation of grazing sheep during dry season

On-farm trial was conducted at Gumer (Gera Keya woreda) to evaluate and demonstrate on-station generated technology of feed supplementation of sheep during the dry season. The experimental animals were allocated to three treatments, namely, free grazing; free grazing plus 360gm vetch hay plus 160gm wheat bran; free grazing plus 500gm vetch hay. Average daily body weight gain of 5.14gm, 52.81gm, and 39.41gm was obtained for free grazing (control), vetch hay plus wheat bran supplemented, and vetch hay only supplemented groups, respectively. Average final weight, daily weight gain and daily net DM intake for the three treatments was significantly different. The highest gross return is from vetch plus wheat bran supplemented feeds (27 Eth. Birr/head).

viii) Low-cost gravity drip irrigation: assisting water-harvesting schemes

Water harvesting schemes implemented in the Amhara region are intended to contribute to food security and income of the rural household. Farmers have recognized the benefits from this technology, and the demand for more is coming from the rural communities. Due to the limited amount of stored water, the schemes must be supported with appropriate and efficient water application methods in order to realize the anticipated benefits.

Farmers apply water to their fruit and vegetable plots by simple flooding using buckets or similar watering containers. This method leads to excessive loss of the valuable water and may even be insufficient to cover the crop demand for a season. On the other hand, drip irrigation is known for its applicability and water use efficiencies and saving of labor. However, the high initial costs, mostly discourages smallholder farmers to invest in the system.

With the initiation and support of AMAREW, researchers at Debre Berhan centers have tested low-cost gravity drip irrigation. A graduate student under the supervision of AMAREW staff has also successfully carried out a field experiment of low-cost gravity drip irrigation at Adet using locally available scrap materials and found it to have a acceptable performance compared to the imported equipment (Figure 4). Sekota Research Center has also been engaged in the same type of field trial in Sekota woreda. It is believed that local people can easily reproduce the system components after receiving the necessary training.



Figure 4. Low-cost gravity drip irrigation experiment at Adet Research Center

3.5.2.4 Sekota Research Center

i) On-farm evaluation of Triticale in Sekota woreda

Triticale is adaptable to drought prone areas and marginal lands like Sekota woreda. The Sekota Research Center conducted on-farm evaluation of triticale at two locations in (Woleh and Zarota) in the woreda to see the performance of two varieties (Sinan and Uosgan) under farmers' conditions, and to assess farmers' selection criteria for these varieties.

A significant difference was observed in both locations between improved management (fertilizer and weeding) practice and farmers' traditional practice. The yield difference between the two varieties was also significant. Sinan and Uosgan gave an average yield of 16 and 13 qt/ha, under improved management, and 10 and 7 qt/ha under farmers' practice, respectively. The grain yield of the local check, wheat *Kinkina*, was 12 and 6 qt/ha under the respective management practices. Farmers preferred Sinan for its earliness in grain filling and maturity and higher biomass production than Uosgan, but they complained about the difficulty in threshing that it demands much labor and time. According to farmers' assessment, both varieties of triticale have good quality for injera and bread making.

ii) Location specific on farm fertilizer trial

The trial was conducted on farmers' fields for two years with the objective of generating fertilizer recommendations for specific locations. As a result, area specific nitrogen and phosphorus fertilizer rates for wheat at Woleh (very close to Yeku pilot watershed in Sekota) were determined. The application rate of 46 kg N + 69 kgP₂O₃ gave the highest yield production (19 qt/ha), while the control with no fertilizer (farmers' practice) gave the lowest yield (12 qt/ha).

3.5.3 Small Grants and Mentorship Program (SGMP)

All researchers and the respective mentors in the US have continued communication and consultations and continuously reported the outcome to AMAREW by e-mail. The field activities are also underway by the researchers in the selected research sites in the region.

i) Dr. Conrad Heatwole, mentor of Mr. Gizaw Desta of Debre Berhan Research Center, came for a second time to Ethiopia in August to visit and provide advisory support on the field research work funded under the Small Grants and Mentorship Program (SGMP) of AMAREW project. During his visit field survey and measurements of certain parameters, digital photographing of the rill system have been taken at Andit Tid watershed in North Showa. Meanwhile, during his visit in Bahir Dar, Dr. Heatwole gave a short training to employees of EPLAUA on advanced GIS techniques.

ii) Dr. Earnst W. Tollner, mentor of Mr. Miheret Endalemaw of ARARI's Fishery Research Center, paid a visit to Bahir Dar and discussed with his advisee about the research project. He also visited the proposed project site near Woreta for the research work. Meanwhile, he gave a seminar on watershed management to staff of partner institutions in Bahir Dar. Mr. Meheret whose research project is entitled "Assessment of major threats of Lake Tana and strategies for integrated water use management" had made also earlier in the year a trip to the Arba Minch University to gather data and experiences in the same research area on Lake Abaya and Lake Chamo.

iii) Dr. John McPeak of Syracuse University and mentor of Mr. Tilaye Teklewold (Debre Berhan Research Center) paid a visit to the center in April and discussed with Mr. Tilaye on the design and implementation of the research project. The mentor also visited the selected research woredas (Gera Keya, Kewet, and Enewari). The title of project is "Determining the optimal enterprise mix in crop-livestock integration for sustainable farming systems in the highlands of Amhara Region".

Taking advantage of the visits of the mentors, Dr. John McPeak also gave a seminar to the Debre Berhan Research Center on Livestock Marketing on the Ethio-Kenya Border.

iv) Dr. Asmare Atalay of Virginia State University, has taken the responsibility of a mentor of Dr. Enyew Adgo, and Ato Mekonnen Getahun on their research project entitled "Assessment of soil characteristics, surface water qualities and water table fluctuations on selected irrigated command areas in East and West Gojjam, and Awi zones". Preliminary survey on traditional and modern irrigation schemes in East and West Gojjam and Awi zones has been conducted in eight selected sites. The selected irrigation projects were Jedeb irrigation project from East Gojjam; Fetam irrigation project from Awi zone; and Geray, Lah and Tikurit/Mendel irrigation projects in West Gojjam in Jabi-Tahinan, Sekela.

3.5.4 Other Activities

i) Inductive Training on Natural Resources Management:

The Research Advisor, Dr. Fekadu Yohannes, offered during the year a three-day training on agricultural water management research methods to young and newly recruited researchers as part of the Inductive Training program organized by ARARI with the support of AMAREW project. We believe starter that such a training program would prepare and equip researchers with the necessary initial skills and attitudes. We observed that the training given has stimulated the researchers to come up with new research proposals in the area of natural resources management, including agricultural water management as witnessed at the 2005 Annual Research Review Meeting of ARARI.

ii) Participation in workshops

The research component personnel of AMAREW were invited to and presented papers in workshops organized by different organizations in the region/country.

- 1) Drs. Brhane Gebrekidan and Fekadu Yohannes participated at the workshop on Irrigation Water Management, organized jointly by ARARI and SWHISA (CIDA-supported project), December 5-7, 2005. Dr. Fekadu presented a paper on “Agricultural Water Management Research, and priorities in ANRS” at the workshop.
- 2) Dr. Fekadu presented a paper on “Soil Erosion and Sedimentation: The case of Lake Alemaya”, at the awareness creation workshop on wetlands in the Amhara Region, organized by Ethio Wetlands and Natural Resources Association – Center for combating desertification and Finland Embassy in Ethiopia, September, 2005. Dr. Fekadu gave also an interview on lakes and wetland problems of Ethiopia to the ANRS Radio Program.
- 3) Drs. Brhane Gebrekidan and Fekadu Yohannes, attended the Annual Research Review Meeting organized by ARARI in Bahir Dar in January 2005. Dr. Fekadu served as the chairman of the Natural Resources Group Meeting, while Dr. Brhane chaired the plenary and concluding session.
- 4) Dr. Brhane Gebrekidan, Dr. Fekadu Yohannes, and Ato Yitayew Abebe attended the Third International Symposium on Ethiopian Development Studies, organized by the Ethiopian American Foundation (EAF), and The Ethiopian Agricultural Research Organization (EARO), June 18-19, 2005, Addis Ababa. Dr. Brhane presented an AMAREW team paper highlighting and reflecting on the lessons learned from the AMAREW project.
- 5) Dr. Brhane and Dr. Fekadu participated in the workshop on the global theme IPM on “Management of the weed *Parthenium hysterophorus* L. in Eastern and Southern Africa Using Integrated Cultural and Biological Control Measures”, for Grant Application to IPM CRSP, Global IPM Theme Programs (GTPs), organized by EARO and Virginia State University. June 13-15, 2005, Addis Ababa. Dr. Brhane gave presentation on an overview of the IPM CRSP.
- 6) Dr. Brhane also participated in the planning workshop of the Parthenium IPM Global Theme and gave a presentation focusing on the “expectation of the SPM CRSP”, December 12-16, 2005.

- 7) Dr. Brhane and Dr. Fekadu participated at the workshop on Sustainable Development and Poverty Reduction Program II (SDPRP) (1998-2002 Eth. Cal.) of Amhara Region, June 29 - July 1, 2005 Bahir Dar.
- 8) Dr. Fekadu Yohannes being a member of the Technical Advisory Committee on Lake Tana Basin, attended the committee meeting that took place at the Bureau of Water Resources Development.
- 9) Both Drs Brhane and Fekadu participated as trainers in the Inductive Training under the Training Component. The Research Advisor, Dr. Fekadu Yohannes offered a three-day training on agricultural water management research methods to young and newly recruited researchers as part of the Inductive Training. Dr. Brhane also covered overall orientation to researchers for a couple of days.
- 10) Furthermore, the senior staffs of AMAREW, taking the opportunity of their presence in the region, have been invited by collaborating higher learning institutions in the country to advise MS degree students on their thesis research work conducted in the ANRS. In this regard, Dr. Fekadu has served as an advisor of three graduate students of Alemaya University and one student of Mekelle University.

3.5.5 Observed problems

- The calendar for research activities of centers slightly deviates from this reporting period; as a result, the joint planning workshop of research-extension on the implementation (action plan) of on-farm research trials in the targeted Kebeles of each woreda has been postponed to end of January 2006 until the analysis of completed adaptive on-farm research projects of the centers has been finalized for promotion to pre-extension demonstration activities. The review meeting of all completed research projects at the regional level is scheduled by ARARI for sometime in April, 2006.
- The implementation and completion of planned research projects largely depends on a stable and sustainable manpower situation. Though ARARI is making efforts to tackle the manpower shortage of its centers within its budget limitations, and many are returning after study leave, the high staff turnover of research centers as well as the woreda agriculture offices remains still as a major challenge and outstanding problem. A human resources development plan of ARARI with the proper consideration of training plan, promotion criteria and other incentive structures are yet to be worked out.
- Despite some efforts made by ARARI centers to encourage the involvement of the woreda extension in technology generation and transfer, the research-extension linkage of the region is still loose. Research and extension normally operate as separate entities instead of being complementary and supportive in addressing the production and productivity problems of the agricultural sector.

4. Extension Component

4.1 Introduction

The Extension Component of the Project has been engaged during the year in promoting information and technology that assist target house holds (HHs) to increase agricultural production and productivity and thereby contribute to raising HH incomes. Consequently, project intervention in extension in the five pilot woredas, namely, Lay Gayint, East Belessa, Gubalafto, Tehuledere and Sekota was geared towards strengthening the transfer of technology mainly in crop, livestock and natural resource development sectors. Cross cutting themes, addressed through the extension activities have included gender, nutrition and HIV/AIDS.

This portion of the annual report is organized in eight sections. The first section covers plan preparation activities coupled with revision of the original plan in response to the internal monitoring of project progress. Accomplishments of the extension component under crop, livestock, and natural resources are narrated in the second section. Accomplishments under cross cutting themes, home science, and capacity building are discussed in the third section. The fourth section deals with monitoring and evaluation activities. The fifth section covers accomplishments which were not anticipated in the work plan. Section six covers the budget utilization profile of the extension component. Problems encountered and solutions devised are narrated in section seven. Concluding remarks are given in section eight.

4.2 Plan preparation

Along with all the other components of the project, the 2005 annual work plan for extension was initiated at the end of 2004. Modifications and adjustments to the plan were made during the year based on the facts on the ground.

4.2.1 Action plan for individual pilot Woreda

Following the approval of the annual work plan, action plan of the individual pilot woreda was prepared by each participating Woreda Office of Agriculture and Rural Development (WOARD) with the technical advisory assistance of the extension and training advisors of the project. The action plan was essential to enhance project implementation by each WOARD. The action plan specified flow of activities, implementation schedule, and accountability.

4.2.2 Plan revision

The mid-term internal evaluation of implementation progress of each WOARD revealed that planned activities were behind schedule in implementation. Consequently, revision of the original plan and preparation of a modified action plan for the last two quarters for each pilot woreda was done. Project activities which were season dependent and not completed were dropped and the respective budget was reallocated for appropriate and workable activities which were either in the

original plan or new. Such a revision was done in close discussion and consultation of the appropriate WOARD officers.

4.3 Accomplishments of the extension component

4.3.1 Procurement and distribution of improved seed:

Effort has been made to procure and distribute seeds of improved varieties of crops planned for dissemination in the pilot woredas. Almost all the seeds procured and distributed in the five pilot woredas were obtained within the region from Adet and Sirinka Agricultural Research Centers and the Bahir Dar branch of the Ethiopian Seed Enterprise. The delay in the budget release aggravated by the bureaucratic bottlenecks of the woreda finance single pool system were the main impediments to procure and distribute seeds of the right varieties in the right quantity and quality and at the appropriate time, in compliance with plan. Regardless of these impediments, the following achievements were realized primarily due to the special budget loan provided by the FSPCDPO.

4.3.2 Cereal Crops

As shown in Table 6, out of a total of 297 quintals of seed of 17 improved varieties of six crops planned, 235 quintals of seed of 21 varieties of six crops were procured and distributed to targeted farmers in the five pilot woredas. These accounts for 91% of the physical plan.

As per the report of pilot woredas where harvest is completed, such as East Belessa an average productivity of as much as 26 quintals per hectare was registered on tef – Cr-37 variety. The yield of the local variety with the traditional practice remains to be 5-7 quintals/hectare only. An average productivity of 11 qt/ha for sorghum of six different varieties, 28 qt/ha for maize Katumani variety, 32 qt/ha for maize QPM-542 variety, 9 qt/ha for chick pea, 12 qt/ha for faba bean CS-20-DK, 9 qt/ha for faba bean Holeta variety, 12 qt/ha for Tef DZ-01-196, 9 qt/ha for tef DZ-974 and 21 qt/ha for wheat HAR-1685 was recorded in Guba Lafto woreda. These results appear to be encouraging compared to average productivity of the respective crops using local varieties under the traditional practice. Such results should potentially bring change on food security situation of the target households and thus a mechanism of scaling up such a successful technology through revolving seed distribution is put in place by the project. Summary of these results is given in Table 5.

Mean while, in Sekota woreda, poor yields as low as 6-7 qt/ha for CR-37 and 5-6 quintals for DZ-01-196 tef varieties were registered. A productivity of 14-15 qt/ha was obtained on both wheat (HAR-1685) and triticale (Mynit) varieties by target house holds (HHs) in Sekota woreda. Compared to the yields of the local varieties, which has seldom been exceeding 6-8 qts/ha, it appears to be an encouraging result.

Table 5. Selected crop yields, in qt/ha, from selected pilot woredas, 2005 crop season

Crop	Variety	Yield, qt/ha	Woreda
Tef	CR -37	26	East Belessa
	DZ-01-196	12	Sekota
Sorghum	Different varieties	11	Guba Lafto
Maize	Katumani	28	Guba Lafto
	QPM – 542	32	Guba Lafto
Faba Bean	CS-20 – DK	9	Lay Gayint
Wheat	HAR-1685	21	Guba Lafto
	HAR-1685	15	Sekota
Triticale	Mynit	15	Sekota

4.3.3 Pulse crops

Pulses in the region have become high value market crops and thus appropriate varieties identified by researchers were planned for distribution in the pilot woredas. A total of 103 qts of five improved varieties of five pulse crops were planned for distribution in four of the pilot woredas. However, 131 qts of seven improved varieties of three pulse crops, which accounted for an accomplishment of 127% of the physical plan, was distributed to selected farmers. A total of 571 house holds (HHs), 539 male and 32 female, have been beneficiaries of improved varieties of pulse crops distributed in the four pilot woredas.

Livestock

4.3.4 Poultry

- A total of 2500 improved poultry chicks which accounts for 33.% of the physical plan were distributed to selected farmers. Difficulty to transport day old chicks from hatching centers in the region has been an impediment to meet the physical plan.

- Hay-box brooder provision was also limited to 20 out of the total of 155 indicated on the plan.

4.3.5 Beekeeping

- 109 improved beehives were distributed to target HHs compared to a total of 100 actually planned for the year.
- 140 transitory beehives, which accounts for 93% of the plan (150) were also distributed.
- We were unable to provide 170 bee colonies and 8000 top bars.
- Provision of wax was recognized to be an important measure to be introduced while revising the plan. As a result this, 602 kg of wax was purchased and distributed to selected farmers while the target in the original plan was only 85 kg.
- Early adopters of transitory bee hives in Sekota and Tehuledere woredas have realized a productivity of 15-25 kg of honey per hive, which normally does not exceed 3-5 kg/hive using traditional hives and practices. This implies that further dissemination of this technology in the two woredas could potentially triple or quadruple household income.

4.3.6 Small ruminants

- 125 improved breeds of Washera rams were distributed to selected farmers in Lay Gayint woreda and thus the target in the original plan is fully achieved.
- Distribution of 82 improved goats was carried out in Guba Lafto woreda.
- Six improved Sennar donkeys for use in mule breeding was planned for distribution to farmers in one of the extension kebeles in Guba Lafto woreda. This was not achieved mainly because of difficulties and bureaucratic procedures faced by WOARD on procurement and purchase.

4.3.7 Forage development

- Distribution of about 336 kg of forage seed was accomplished compared to 151 qts of the planned amount.
- Similarly, 62 ha of forage development was realized out 570 ha indicated in the physical plan.

4.3.8 Agro-forestry

- Provision of materials for supporting nurseries 97%
 - 1136 kg of polythene tube which represents 97% of the physical plan was delivered by WOARD.
 - Only 8 qt of tree seeds was supplied out of a total of 90 qts planned.
- Seedling plantation numbering 1,102,278 was accomplished compared to 620,000 in the plan.
- The plan for construction of 12000 micro basin has not been realized.

4.3.9 Soil and water conservation

- Out of 1080 m³ of terrace construction planned, an achievement of only about 10 m³ was realized.

- Eleven km of hill side terrace was constructed while the plan was 50 km.
- The plan for preparation of trenches was 37,000 but only 5,258 was accomplished.
- Out of 15 recharging pits planned for construction only two were done.
- Out of 2240 m³ check dam construction planned only 98 m³ was achieved.
- Gully rehabilitation of about five ha was planned and achieved.
- Out of the 150 km bund stabilization planned nearly all was realized.
- A construction of 30,000 eyebrow basins was planned, however, 10,000 actually was accomplished.

4.3.10 Extension and home science

- The expected follow up performance of the previous year trainees of fuel saving stove in Sekota, Guba Lafto, East Belessa and Tehuledere woreda has not been carried out and thus feed back report has not been received.
- Tehuledere woreda met the planned target to assist school anti-HIV/AIDS clubs operating in extension kebeles.
- The target to introduce simple and cheap solar devise for house hold use planned by Tehuledere woreda was fully achieved.
- Fuel saving stoves popularization by the project is moving fast into project beneficiaries of Tehuledere woreda. Significance of the technology in saving fuel wood, reducing workload burden of women and children creating a relatively comfortable home kitchen environment for rural women, and contributing towards environmental protection is well recognized by the rural HHs.

4.3.11 Capacity building

Most of the trainings on crop production techniques were aimed at imparting skills on technologies planned for dissemination by the project. Accomplishment of WOARD through planned training sessions was below the expected target. Out of a total of 1330 farmers planned to be trained on cereals and pulses, horticulture, coffee, IPM, small scale irrigation, moisture conservation, triticales processing, and tools & equipment only 102 farmers were trained, and out of a total of 15 DAs planned to be trained in related fields only 3 were trained.

Training sessions on poultry management, hay box brooder making, bee keeping, small ruminant management, managing and feeding milking cows and forage development were planned for a total of 548 farmers, however, only 90 farmers were trained.

In natural resources, training of 10 development agents on management of natural resource was planned and accomplished.

Training of 135 farmers on water harvesting, moisture conservation, and small-scale irrigation was planned but not achieved.

Training of 70 farmers in fuel saving stoves, family planning, nutrition and HIV/AIDS was accomplished by Sekota woreda.

Tailored training and/or experience sharing tour involving SMS group, DAs and community leaders/ farmers were planned by all pilot woredas as a mechanism of capacity building. However, for reasons to be discussed on the problem-encountered portion below this has not been implemented.

COLTA training has been planned by almost all pilot woredas, nevertheless, Lay Gayint woreda only implemented it.

4.4 Monitoring and Evaluation

Monitoring activity by the AMAREW project office has been carried out regularly. We have continually detected gaps and shortfalls identified in implementing project activities. Appropriate measures, such as, revision of the annual plan in compliance with the project objective and workshop for awareness creation on implementation status of project activities and solution to be introduced were taken based on the results of our monitoring activity. An assessment on implications of technologies disseminated, implementation performance of WOARD, and on extension methods employed was carried out during the workshop organized for reviewing program activities of 2005 and carrying out planning exercise of 2006.

4.5 Other activities

- The project office organized a two days woreda level extension activity implementation assessment workshop in Woldiya. The workshop was recommended by the RIT. A total of 21 participants from WOARD of pilot woredas, AMAREW project technical advisors, and RIT members attended the workshop that concluded by passing resolutions for improvement of the existing status of implementation performance of WOARD.
- Woreda level review workshop which has been planned by all the pilot woredas for reviewing the 2005 performances and carry out the 2006 planning exercise was adequately accomplished through the coordination of the project office.
- Farmers' day and demonstrations were conducted in accordance with the plan in almost all pilot woredas on crops under dissemination.
- Provision of incentive (financial) for DAs was planned by almost all pilot woredas, with the assumption of improving their performance in implementing project activities. Nevertheless, it was later recognized to have negative consequences and not implemented.
- The extension advisor of the project attended the field days organized by Ethiopian Institute of Agricultural Research (the former EARO) at the Melkassa research center and by ARARI at Fogera rice on-farm trials. Good lessons that could be extended to the project sites were learnt on value chain haricot bean production employing the FREG approach and opportunities of scaling up rice as a potential staple food.

4.6 Budget profile and Utilization

Although the final version of the 2005 work plan was released to stakeholders in January 2005, the budget was released in June 2005. However, the project has been devoting efforts to overcome the challenge of financial requirement of seasonal activities through budget loan that was accessed from the regional FSPCDPO. Most activities, such as bee keeping, forage development, seedling production etc had expired due to the budget delay. Because of the plan revision and the unusual socio-political problems of the year, most of the training activities did not materialize. As the result of this, WOARD of pilot woredas were able to utilize the first tranche (40%) by the end of the 3rd quarter. By the end of the year most have accounted for the money that has been advanced to them.

4.7 Problems encountered and solutions devised

The following main problems were responsible for the poor accomplishment of planned extension activities at the WOARD level:

- Implementers at WOARD and the farmers' level were fully occupied with the national election related activities for almost the whole year.
- The single pool financial system of woredas, introduced at the beginning of the year as a mechanism of decentralization, was found to be an impediment on procurement and distribution of input on time.
- High staff turnover at the WOARD level had negative consequences.
- Delay in budget release of the project has been a critical impediment of the 2005 accomplishment.

Solutions devised

- Budget loan support was partially accessed from FSPCDPO to capture some seasonal activities such as procurement and distribution of seeds of improved varieties.
- Program coordination support for procurement and purchase of inputs has been facilitated by the project office.
- The extension implementation workshop, which was organized for the assessment of the delayed implementation performance of WOARD, was planned for enhancing implementation of project activities.
- Revision of action plan was introduced by mid-year to drop project activities whose season of implementation had passed due to the budget release delay and replace them with modified intervention options.

4.8 Conclusions

The implementation performance of the extension component of the project during the year was significantly below target. Fund utilization by WOARD has not been satisfactory.

Intervention through extension is highly people oriented and thus influenced significantly by the overall atmosphere prevailing in the society at a given point in time. The socio-political situation that has been prevailed the whole year has was a major challenge of the extension component of the project, because it was critically difficult to divert people's attention and concern towards the desired direction. We believe and hope the situation will change in 2006. Timely budget release in accordance with the milestone set by the RIT and USAID/Ethiopia is critical for the timely implementation of the activities during the coming year.

Table:6 Summary of planned versus achieved activities across the five woredas (East Belessa, Lay Gayint, Sekota Gubalafto, and Tehuledere) of the AMAREW Project in 2005

No	Activity	Unit	Planned	Achieved	% Achieved
I	Crops				
	Improved seeds and planting stocks				
	Cereals		279	253.65	90.9
	Tef	Qt	51	87.4	171
	Wheat	Qt	155	122.9	79.3
	Maize-	Qt	30	15.85	52.8
	Sorghum diff. Varieties	Qt	18	6	33.3
	Barley	Qt	10	7	70
	Triticale	Qt	15	14.5	96.7
	Pulses	Qt	103	131	127
	Faba bean CS-20-DK & Holetta	Qt	25	81	324
	Haricot bean- Awash Melka	Qt	20	10	50
	Chick pea- Mariye, Arrerti and Shasho	Qt	50	40	80
	Field pea	Qt	6	0	0
	Ground nut	Qt	2	0	0
	Oil seed-Linseed		6	0	0
	Vegetables		283	291.75	103
	Diff. kinds of vegetables	Kg	109	38.5	35.3
	Carrot	Kg	58	64.5	111
	Cabbage	Kg	10	30	300
	Beet root	Kg	10	42	420
	Swiss chard	Kg	26	76	292
	Tomato	Kg	20	20.5	103
	Shallot	Kg	5	18.25	365
	Lettuce	Kg	5	0	0
	Pepper	Kg	40	2	5
	Potato	Qt	114	0	0
	Garlic	Qt	20	25	125
	Sweet potato	Cutting	370000	908756	246
	Shallot seedlings	No	0	655329	*
	Cabbage seedlings	No	0	161515	*
	Pepper seedlings	No	0	70400	*
	Tomato seedlings	No	0	9700	*
	Horticultural crops				
	Papaya Solo	Kg	10	0	0
	Mango& papaya	Qt	2	0	0
	Mango	Qt	1	0	0
	Avocado	Qt	1	0	0
	Horticultural crops seedlings	No	22680	3354	14.8
	Mango seedlings	No	0	1524	*
	Avocado seedlings	No	0	1830	*
	Papaya seedlings	No	1080	0	0

Table 6 Continued

	Grafted apple seedlings	No	500	0	0
	Avocado and mango seedlings	No	4600	0	0
	Highland fruit root stock	No	500	0	0
	Sweet orange seedlings	No	2000	0	0
	Papaya and cassava seedlings	No	14000	0	0
	Equipment and facilities	No	106	19	17.9
	Tie-ridger and Armstrong plow	No	47	0	0
	Pedal pump	No	0	19	*
	Barrel drip irrigation	No	25	0	0
	Rope and washer pump	No	16	0	0
	Grain stores	No	15	0	0
	Potato storage (DLS)	No	3	0	0
2	Livestock				
	Poultry				
	Day old chicks	No	7500	2500	33.3
	Three months pullet	No	0	192	*
	Hay box brooder	No	155	20	12.9
	Bee keeping				
	Modern bee hives	No	100	109	109
	Transitory bee hive	No	150	140	93.3
	Top bars	No	8000	0	0
	Wax	Kg	85	602.5	709
	Bee colony	No	170	0	0
	Protective gloves & working tools				
	Small ruminant	No	215	207	96.3
	Washera ram	No	125	125	100
	Improved breed goats	No	90	82	91.1
	Provision of Sennar donkeys	No	6	0	0
	Forage development				
	Forage seed	Qt	151	3.36	2.23
	Forage development overall	Ha	285	31	10.9
	Back yard forage development	Ha	180	31	17.2
	Over sowing closed area	Ha	60	0	0
	Under sowing/farmland forages production	Ha	45	0	0
	Veterinary service				
	Vaccination	No		2100	*
	Internal parasite	No		800	*
	External parasite	No		370	*
	Treatment	No		86	*
3	Natural resources				
	Polythene tube	Qt	11.67	11.36	97.3
	Tree seeds	Qt	90	8	8.89
	Agroforestry				
	Tree plantation	No	620000	1,102,278	178
	Micro basin	No	12000	0	0
	Terrace construction	M ³	1080	10	0.93

Table 6 Continued

	Trench	No	37000	4549	12.3
	Recharging pit	No	15	2	13.3
	Small dam construction	No	1324	0	0
	Gully rehabilitation	Ha	6	5.2	86.7
	Check dam	M ³	2240	0	0
	Bund stabilization	Km	150	140.26	93.5
	Eyebrow basin construction	No	10000	30000	300
	Compost making	M ³	1800	20700	115
4	Training-Farmers and DAs	No	2209	115	5.21
	Farmers	No	2178	102	4.68
	DAs	No	31	13	41.9
	Crop production – farmers	No	785	27	3.44
	- DAs	No	15	3	20
	Water harvesting, moisture harvesting: - Farmers	No	545	75	13.8
	Livestock: - Farmers	No	548	90	16.4
	- DAs	No	3	0	0
	Poultry	No	165	0	0
	Bee keeping- Farmers	No	143	0	0
	-DAs	No	3	0	0
	Small ruminants	No	90	0	0
	Dairy farmers	No	60	0	0
	Forage growers	No	90	0	0
	Natural resource development; -DAs	No	10	10	100
	- Farmers	No	135	0	0
	Extension and home science: - Farmers	No	165	70	42.4
	- DAs	No	3	0	0
	Women weavers	No	15	0	0
	Women Potters	No	15	0	0
	Fuel saving stove, family planning, nutrition and HIV/AIDS	No	60	70	117
	Follow-up training FREG members- Farmers	No	75	0	0
	- DAs	No	3	0	0

* Achieved but not planned

5. Integrated Watershed Management Component

5.1 Objectives of the component

The watershed management component of the AMAREW project aims at serving as a site-specific integration model of research, extension and micro-enterprise activities of the project. Accordingly, the component's major objective is to facilitate the testing of the practical effectiveness and sustainability of a community based watershed management approach for environmental rehabilitation and ultimately attaining food security at watershed level.

5.2 Areas of intervention

The watershed component of AMAREW project in partnership with BoARD, ARARI and EPLAUA is engaged in testing a wide range of technologies, which are believed to solve critical problems affecting the rural communities of the three pilot watersheds, namely Yeku, Lenche Dima, and Gumet. Table below illustrates the various development interventions under implementation in relation to the problems identified by community members of the pilot watersheds:

Sector	Major problems	Sector interventions
Natural Resources	Soil erosion	Physical and biological conservation measures
	Deforestation and shortage of wood for fuel and construction	Tree plantings on closed areas, homesteads, introduction of improved stoves, training and demonstration
	Moisture stress, water shortage both for humans and livestock	Improved tillage practices, in-situ moisture conservation and water harvesting
Agronomy	Erratic and poor distribution of rain fall	Introduction of in-situ moisture conservation practices, introduction of drought resistant and early maturing crops and varieties early maturing varieties, training and demonstration
	Lack of seed of improved varieties	Introduction of early maturing varieties, on-Farm research with improved released varieties,
	Insect and pest problems	Establishment of Farmers' Field Schools (FFS) and Integrated Crop Management (ICM) groups, demonstration of improved storages
	Declining soil fertility	Compost production, green manuring, proper crop management
Livestock	Shortage of animal feed	Forage development on back yards, Closed areas, gullies and bunds
	Animal health problems	Increase mobile health service, training Community Animal Health Workers (CAHW)
	Livestock water shortage	Construction and maintenance of ponds and watering points
	Low income and poor livestock management practices	Introduction of improved bee hive, poultry, small ruminants, and training and demonstration in livestock management
Social issues	Weak local institution	Establishment and empowerment of local Community Watershed Management Organization (CWMO)
	Low level participation of women	Creation of organizational space for women, gender balanced development
	Increased HIV/AIDS problem, high fertility rate, poor nutritional balance	Establishment of Anti HIV/AIDS clubs, awareness raising programs, family planning, nutrition and home management training
	Small farm size, lack of cash	Organization of Micro-enterprise development, off-farm income generation activities, credit provision, etc.

Planned activities for 2005

Strengthen community level watershed management

Build the capacity of local community and extension workers on watershed management organization in planning, implementation, monitoring and evaluation of the overall pilot watershed development process.

Watershed development activities

Through community participatory planning approach the planned watershed development activities were:

- Water supply and development for house hold use and livestock consumption
- Bio-physical soil and water conservation and land rehabilitation
- Crop production and protection
- Livestock and forage development
- Start up of Gumet watershed integrated development
- Micro-enterprises development and strengthening
- Institutionalizing watershed management in the ANRS

5.3 Major tasks accomplished

The summary of the major tasks accomplished shown as activities planned versus achievements for Yeku and Lenche Dima is given in Table 7.

5.3.1 Water resource development

i) Water supply: One of the major problems in the pilot watersheds is the shortage of clean water access for humans and livestock consumption. Main source of water for human and livestock consumption are ponds rivers, springs, and some hand dug shallow wells. Most of these sources are seasonal. People, mainly women and children, have to travel over long distances in search of water. During the rainy season, most of the springs and ponds are contaminated with floodwater.

ii) Spring development: The watershed component in the last two and half years gave due consideration to the construction of hand dug shallow wells, and developed springs and ponds. These water schemes are managed and operated by a water committee selected from the community. Water use fees are properly collected from the community for minor maintenance costs and guarding. The main contribution of these schemes is the reduction of workload for women and children and health improvement for the whole family(Figure 5 and 6).



Figure 5. Water supply for house holds use

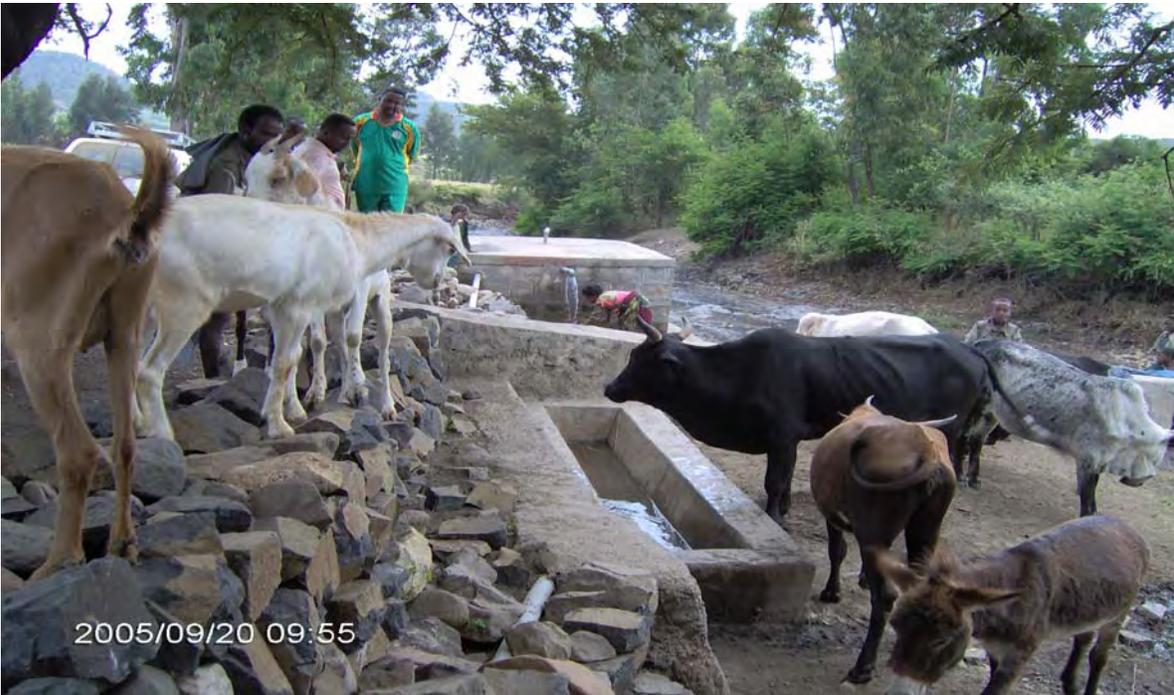


Figure 6. Water supply for livestock consumption at Yeku

iii) **Water harvesting:** Moisture is also identified as a major problem for reliable and sufficient crop production. In line with the government's strategy direction in the construction of different water harvesting structures for supplementary irrigation at household level, very encouraging results have been obtained in the pilot watershed sites. The selection of water harvesting structures is based on farmers' evaluation on the performance, management, cost and labor requirement factors. While the hand dug shallow wells are more preferred at Yeku watershed, the dome shaped rainwater-harvesting structure is more preferred at Lenche Dima watershed (Figure 7).



Figure 7. Pepper productions with supplementary irrigation from dome shaped water-harvesting structure at Lenche Dima

iv) **Shallow hand-dug well:** One of the positive impacts of the soil and water conservation work is the reduction of run-off and increased water infiltration resulting in improved ground water recharge. Yeku watershed, which was considered as an area with low ground water potential, was made possible to get water at a depth of 8-10 meters after the extensive conservation work on the surrounding hillsides of the watershed (Figure 8).

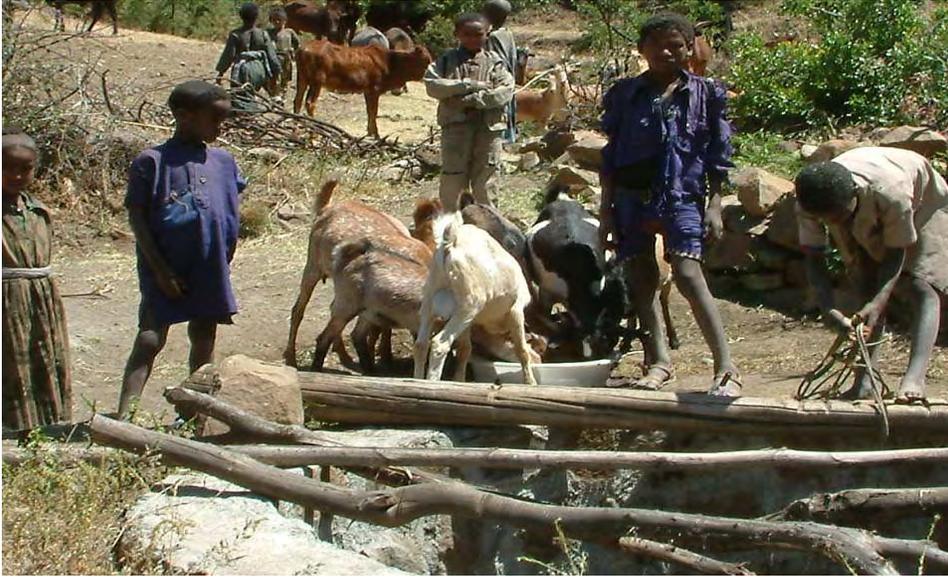


Figure 8. Shallow hand-dug well water supply for livestock, Yeku watershed

5.3.2 Bio-physical soil and water conservation and land rehabilitation

The major interventions within the two pilot watersheds in the area of natural resource and environmental rehabilitation are physical and biological conservation activities, during this physical year, a total number of 2,020 eyebrow basins, 23,216 trenches and 153 km of hillside terraces, and 75 ha closure areas were completed. In line with this, 3,196 m³ loose rock and gabion check dams also were constructed through food for work in addition to free community labor.

A total of 167,249 seedlings of different species were planted within the three pilot watershed sites. The plantations were carried out on hillsides, gully areas, closure sites and at homesteads. A significant number of farmers have also been involved in private woodlot establishment especially in the Gumet watershed. Each household planted 1,250 seedlings of Eucalyptus and tree-lucern species for fuel wood and fodder production, respectively. All plantations were carried out with community mobilization without grain or cash payment. Parallel to the plantation program in the three watersheds, closed area management is showing high level of acceptance by the community. In 2005, additional hillsides have been closed and put under communal protection and management.

5.3.3 Crop production

Parallel to the tree planting, demonstration on the use of improved crop varieties through the research and extension component of the project was conducted in the pilot watersheds during 2005. Seeds of different improved crop varieties including tef, sorghum, barley, wheat, triticale were distributed to selected farmers.

Seeds of potato, garlic, and cuttings of sugar cane were distributed to farmers with water harvesting structures. These farmers were also supplied with seedlings of papaya, avocado, mango, orange, and banana. Figure 9 shows individual farmer managed fruit development initiative at the Lenche Dima watershed. There are a total

of eighteen households with dome-shaped water-harvesting structures in Lenche Dima with adequate all year round water supply for supplementary irrigation for the production of vegetables and fruits.



Figure 9. Dome water harvesting structure used for fruit production

5.3.4 Livestock and forage development

Livestock development: Under the small ruminants development initiative, seventy farmers, through organized farmers cooperatives, got credit access for the purchase of goats. Each farmer got 720 birr and this money should be returned to the Cooperative and should be revolved in the future. Those farmers who had already started growing back yard forage got priority in accessing credit. Other livestock development technology identified was the provision of day-old chicks. This, however, was not implemented due to disease outbreak at the Kombolcha poultry technology development center.

Forage production: Back yard forage production has shown an encouraging result especially at Yeku. Most farmers at the present have started growing livestock forage as back yard or even on part of their farm fields. These farmers, aside from fulfilling their feed requirement, are making better cash income from the sale of forage seeds to WOARD and NGOs. In this reporting period, 86 farmers have sown 0.125-0.25 ha each.

5.3.5 Gumet watershed launching workshop

The project has started the rehabilitation work of Gumet watershed in 2005. As per the recommendation made by the RIT, Gumet watershed stakeholders' workshop was conducted on September 5, 2005 at the Sekela WOARDA. In this workshop,

representatives from regional partner institutions, FSPCDPO, EPLAUA, BoARD, Woreda Cabinet members, Woreda agricultural experts, development agents and Gumet watershed association members and AMAREW Project staff were present. A total of 34 participants took part in the workshop. Papers on AMAREW project overview, watershed development lessons, potato seed multiplication, temperate fruit production and issues of integration were presented. At the end of the workshop, a reconnaissance field visit was made to the Gumet watershed. The proceedings of the workshop have been written and are available at the AMAREW Project office.

5.3.6 Micro-enterprise development

Promotion of off-farm income generating activities in the pilot watersheds is a major development aspect. One such effort involves training of men and women groups in the production of gabion wire boxes at Lenche Dima watershed. There is a high demand for gabion boxes in the woreda and its surroundings. The nearest source of gabion boxes for Gubalafto woreda is either Debre Tabor or Addis Ababa with a cost of 350 birr per box. The production of gabion boxes at Lenche Dima, in addition to raising incomes of poor women groups, will greatly reduce government and non-government institutions' time spent through long distance travel for the procurement of gabion boxes (Figure 10).



Figure 10. Lenche Dima gabion box producers self-help group

5.3.7 Institutionalizing Watershed Management within ANRS

One of the stated major tasks of the Watershed Management Component of the AMAREW Project is the establishment and institutionalization of an Integrated Watershed Development and Management Team (IWDMT) at the regional level. There have been numerous attempts in the past to bring together representatives from BoARD, ARARI and EPLAUA towards the creation of such a team. This, however, did not materialize yet due to various reasons beyond the control of the project. Nevertheless, AMAREW still believes that without proper institutional arrangement in place, the lessons learned from the on-going pilot projects as well as newly

emerging watershed development initiatives in the region could not be effectively utilized for the full benefit of the ANRS.

The project, together with BoARD, is in the process of identifying and engaging an institutional advisor with a wide range of experience in areas of watershed based integrated rural development to serve as a consultant for institutionalizing watershed management in the ANRS. The selected technical advisor is envisioned to be housed within the BoARD office and will closely work with a team of watershed management institution development Task Force(TF) identified from BoARD, ARARI, EPLAUA, and AMAREW.

Table 7. Activities conducted at Yeku and Lenchedima watersheds in 2005

Activity description	Unit	Yeku watershed		Lenchedima	
		Target	Achievements	Target	Achievements
Soil & moisture conservation					
Area closure	Ha	60	30	75	70
Trench	No	30,000	21,000	5,300	2,216
Hillside terrace	Ha	50	350 (km)	75	256(km)
Micro/eyebrow/ basin	No	30,000	2,020	30,000	-
Check-dam construction	M ³	1,495	3,000	525	439
Sediment storage dam / SSD /	M ³	400	280	-	-
Infiltration pit / micro-pond construction/	no	20,000	500	-	-
Gully revegetation	Ha	-	-	1.75	1.75
Seedling planting	No	70,000	8,599	200,000	79,120
Water harvesting					
Spring development	No	2	1	-	-
Hand-dug well	No	10	3	-	-
Dome construction	No	-	-	10	11
Crop production					
Introduction of seeds of improved varieties	Qt	47	61	18(kg)	18.5
Provision of vegetable seeds	kg	26	32..25	12(kg)	-
Provision of vegetable seedlings (tomatoes, onions, peppers, cabbages)	No		336,746		
Provision of fruit seedlings	no	-	-	500	804
Compost making	M ³	-	960		
Livestock production					
Forage seed distribution	Qt	7	4	15	8
Goat restocking for 70 HH	No	420	420	360	-
Land administration					
Boundary demarcation	Ha			1,400	1,400
Provision of temporary land certification	No		1927	895	745
Training conducted on improved stove	No			60	30

5.4 Significant Problems Encountered

This year's watershed development activities in the two earlier started pilot watersheds (Yeku and Lenche Dima) have lagged behind schedule compared to the outputs of the previous year. Throughout the year there have been numerous meetings, seminars where woreda experts were required to attend. At the time of this writing all WOARD staff were on a three weeks mandatory seminar organized by the ANRS government. This is in addition to the significant time lost in the pre and post election time.

Use of grain for food for work was also a major problem in 2005. Even though the Regional Food Security Program Coordination and Disaster Prevention Office (FSPCDPO) issued a letter of authorization for the use of grain for food-for-work in the two pilot watersheds (Yeku and Lenche Dima), this did not materialize at Yeku. This has greatly reduced the amount of work output for the year. For instance, only 8,598 seedling pits were dug at Yeku compared to 79,150 at Lenche Dima where food for work is going on.

5.5 Action Taken to Solve Problems

- The project has hired one Farmer Community Organizer (FCO) for the Lenche Dima watershed, as there was very limited activity follow-up from the DA assigned to the site.
- Communication with SC-UK regarding the transportation of the approved grain resource to the two watershed sites was done on a continuous basis.

6. Training Component

6.1 Introduction

The AMAREW Project, in collaboration with its local partners, plans and implements various developmental activities under different project components. New and improved technologies with proven potentials to enhance the productivity and production of the crop and livestock sectors and that lead towards sustainable management of natural resources are planned and executed in six pilot woredas and three watersheds. Understandably, for the new and improved technological options to be adopted, researchers and development workers who, respectively, lead the technology development and implementation process and farmers who are the direct users of the technology should have the necessary Knowledge, Skill and Attitude (KSA). Research and development workers are involved in the technology generation and dissemination process at different capacities and levels. Researchers who are developing the technologies and extension personnel who are engaged in technology dissemination proper should keep abreast with emerging methods and changing user needs and market demands. Wide array of personnel including woreda level experts, subject matter specialists and grassroots level extension workers known as development agents (DAs) are found under the extension category. All of them need to have good grasp of the new technology that they are to popularize among the farming community. The grasp shall be in terms of knowledge of the technology proper and on selecting the appropriate methodological options and having the skills that enhance the rate of technology transfer among the ultimate users. Farmers should also have clear understanding on what the technology is all about and on how to make proper and efficient use of it. In view of the seriousness of natural resource degradation in the ANRS, all actors described above should also have clear insights on the importance of commonly managing the natural resources base to secure better livelihoods and to save for the future. One proven way of addressing all the above concerns is to collectively plan and impart training that enhances the KSA of all development workers.

It should also be noted that, following the implementation of decentralized administration in Ethiopia, the Woreda Offices of Agricultural and Rural Development (WOARD) are given the power and responsibility to decide and lead all developmental activities relevant for their Woredas. Such power and responsibility is vested upon the WOARD without adequate human power with the necessary KSA. The necessity of building operational, analytical and managerial capacity of employees of the AMAREW project local partner institutions and farmers in view of providing relevant research and extension services is, therefore, imperative. Long-term degree training, short-term on-job training, educational and/or motivational study tours were, therefore, considered the key towards achieving the AMAREW Project overall goal of enhancing the livelihoods of the rural poor. Hence, as has been the case in the preceding years, the 2005 AMAREW Project training component work plan was designed and executed collectively with other project components and local partner institutions with the above critical considerations in mind.

6.2 Long-term degree training

Long-term degree training of selected research and development workers is taken as one of the principal means for building the human and institutional capacity of AMAREW Project partner institutions. This will facilitate the anticipated research/extension paradigm shift to occur, alleviates the typical mid-career feeling of stagnation and enhances staff motivation and sense of purpose. To achieve this, the project, together with its local partner institutions, identified missing links and key areas that should be strengthened through higher level academic training of partners' staff. The program was implemented by facilitating the recruitment of dedicated workers, with good academic records, assisting candidates in securing placements in local universities and sponsoring their studies. Through this program, diploma holders are being supported to earn BS degree, whereas BS degree holders are being supported to earn MS degree in fields relevant for the regional development.

6.2.1 BS degree training

6.2.1.1 Regular BS program

Three employees of ARARI were assisted to resume their respective class year studies in the regular program at Bahir Dar and Mekelle Universities. Out of them a student named Wolelaw Endale Ambie has to rejoin 1st year classes due to his withdrawal in 2003/04 for health problems (Table 8).

6.2.1.2 Summer BS program

Two employees of ARARI, two from EPLAUA, and five from BoARD were assisted to secure placements in Mekelle, Debub and Alemaya Universities to pursue their BS studies in the summer program. In addition, eleven students were assisted to resume their respective class year studies in the summer program of different local Universities. They are composed of three 2nd year and eight 3rd year students all drawn from BoARD woreda level offices. Among the latter, a student named Tesfaye Setegne Zewdu recruited from BoARD East Belessa and pursuing his 3rd year summer classes in the Land Resource Management and Environmental Protection in Mekelle University (MU) has withdrawn due to a forcing cause. All the rest were supported administratively and financially and have successfully completed their respective class year studies (Tables 9 and 10 for details).

Monitoring and evaluation visit to Mekelle University

To resolve some pending issues related to BS degree trainees and monitor performance of students attending summer program at MU, a project team composed of Dr. Brhane Gebrekidan (CoP and Senior Research Advisor), Mr. Yitayew Abebe (Watershed Management Advisor) and Dr. Eshetu Mulatu (R/E Training Advisor and FtF coordinator) made a monitoring and evaluation visit to MU from 08/27/2005 to 08/30/2005 (Figure 11). Through several useful discussions made with different units of the University and the students the team got important feedbacks on several issues.

Discussions were held with Mr. Kifle Abraha, Summer Continuing Education Program (CEP) coordinator at Endayesus Campus, Mr. Teklegiorgis Assefa, Coordinator CEP at Adi Haki Campus, Dr. Fasil Kebede, Dean Faculty of Dryland Agriculture and Natural Resources, Dr. Tesfay Belay, Head, Department to Dryland Crop and Horticultural Sciences, Mr. Bisrat Woldu, Head, Finance and Budget Division and Dr. Kindeya Gebrehiwot the acting Academic Vice President.

Discussions were centered on some unresolved issues including arrangements for student meals, submission of students' grade reports to the Project office for decisions on subsequent sponsorship, electing project sponsored student delegates to liaise with the Project and University, and other financial and academic matters. Agreements that resolved the issues in question were reached.



Figure 11. AMAREW supported trainees and project staff, Mekelle University, August 2005

6.2.2 MS degree training

Under the Project's long-term training program, three MS aspiring students were assisted during the year to secure placements in Alemaya University in the fields of Agronomy, Breeding and Agricultural Economics. The two students pursuing their studies in Agronomy and Breeding streams were nominated by ARARI, whereas BoARD nominated the student in Agricultural Economics.

Student Zewdu Berhanie Ayele, nominated by ARARI-Sekota and who joined the Department of Agricultural Economics of Alemaya University in 2003-04 Academic Year under the sponsorship of the AMAREW Project has successfully defended his thesis entitled 'Fertility Decisions of Households in Response to Environmental Goods Scarcity: The case of Sekota District, Wag Himra Administrative Zone of Amhara Region, Ethiopia' and submitted a copy of his thesis to the Project office.

Two ARARI affiliated students (Bitew Genet Tasew and Yonas Girma Abebe) and two BoARD affiliated students (Demrew Wossenyeleh Gossa and Getaneh Wubalem Meshesha) are expected to defend their theses in 2005/06 1st and 2nd semesters at Alemaya University. Part of their research financial support was taken care of in the reporting year, whereas part was disbursed to them earlier as per the signed agreement between the students and the project. Details on MS students academic status, fields of study and theses topics are given in Tables 9, 10, and 11.

In addition, Tewodros Bimrew Hailu, an MS aspiring candidate nominated by BoARD-East Belessa, who reportedly had secured a placement in the Department of Animal Sciences, MU, failed to present an official admission letter from the University and left without leaving his address and therefore could not pursue his studies. Moreover, another MS aspiring candidate, Mr. Mihretu Molla Beyene, nominated by BoARD-Sekota to replace Mr. Tesfaye Chekol Mekonen who withdrew because of getting other opportunity could not get placement because of not availing himself for the entrance examination on time.

Table 8. List and academic status of AMAREW Project supported staff members of partner institutions attending BS degree studies in different local Universities, 2005

No.	Name of trainee	Partner institute	Field of study	Training institute	Academic status
1	Tesfaye Setegne Zewdu	BoARD	LaRMEP	MU	Did not attend third summer program due to forced withdrawal
2	Kokeb Bogale Engida	BoARD	LaRMEP	MU	Completed the 3 rd summer program
3	Misganaw Teshome Ayele	BoARD	DCHS	MU	Completed the 3 rd summer program
4	Demerew Hailu Abebe	BoARD	LaRMEP	MU	Completed the 3 rd summer program
5	Aymiro Yhyess Hailu	BoARD	ARWS	MU	Completed the 3 rd summer program
6	Lacketch Mitiku Egezinu	BoARD	LaRMEP	MU	Completed the 3 rd summer program
7	Mekuria Yimer Gesese	BoARD	DCHS	MU	Completed the 3 rd summer program
8	Sitotaw Taffese Ayele	BoARD	Animal Sciences	AU	Completed the 3 rd summer program
9	Aytenew Endeshaw Tatek	BoARD	LaRMEP	MU	Completed the 2 nd summer program
10	Mohammed Hussein Yimer	BoARD	Animal Sciences	AU	Completed the 2 nd summer program due to earlier forced withdrawal
11	Melkamu Ayalew Kebede	BoARD	DCHS	MU	Completed the 2 nd summer program
12	Dilnessa Ewnetu Feleke	ARARI	Mechanical Engineering	BDU	Completed 2 nd year regular program
13	Tefera Mokennen Wolde	ARARI	ARWS	MU	Completed 2 nd year regular program
14	Wolelaw Endale Ambie	ARARI	Mechanical Engineering	BDU	Completed 1 st year regular program following his readmission
15	Addisu Bihonegn Eshetu	ARARI	Animal Science	AU	Completed the 1 st summer program
16	Ashagrie Melkamu Wole	EPLAUA	NREM	MU	Completed the 1 st summer program
17	Berhanu Fentaye Tadfesse	BoARD	Rural Development	DU	Completed the 1 st summer program
18	Biksegne Asfaw Endale	BoARD	NREM	MU	Completed the 1 st summer program
19	Desalegn Abreha Worku	BoARD	NREM	MU	Completed the 1 st summer program
20	Jemila Esleman Jibril	BoARD	Rural Development	DU	Completed the 1 st summer program
21	Mesfin Bahita Tesfaye	ARARI	NREM	MU	Completed the 1 st summer program
22	Teshome Getaneh Lule	EPLAUA	Civil Engineering	MU	Completed the 1 st summer program
23	Tewodros Girma Abebe	BoARD	NREM	MU	Completed the 1 st summer program

AU = Alemaya University, BDU = Bahir Dar University, DU = Dehub University, MU = Mekelle University
 LaRMEP = Land Resource Management and Environmental Protection, DCHS = Dryland Crop & Horticultural Sciences, ARWS = Animal Range and Wildlife Sciences, NREM = Natural Resource Economics and Management

Table 9. Summary of BS and MS students sponsored by AMARE Project and on study under long-term degree program in 2005

BS Degree Training		Number	MS Degree Training		Number
By Class Year			By Class Year		
I		9	I		3
II		7	II		5
III		7	-		
By Employer			By Employer		
ARARI		5	ARARI		5
BoARD		16	BoARD		3
EPLUA		2	EPLUA		0
By University			By University		
Alemaya		3	Alemaya		8
Mekelle		16	Mekelle		0
Debub		2	Debub		0
Bahir Dar		2	Bahir Dar		0
By Field of Study			By Field of Study		
Animal and Range Sciences		5	Agronomy & Breeding		2
Natural Resource Management		5	Agricultural Extension		1
Dryland Agriculture		3	Agricultural Economics		3
Land Resource & Environment Protection		5	Agricultural Engineering		2
Rural Development		2	Animal Science		0
Engineering fields		3	-		
By Sex			By Sex		
Female		2	Female		0
Male		21	Male		8
Total		23	Total		8

Table 10. List and academic status of AMAREW Project supported staff members of partner institutions attending MS degree studies in Alemaya University

No.	Name of trainee	Partner institute	Field of study	Academic status
1	Bitew Genet Tasew	ARARI	Soil and Water Conservation Engineering	Ready to defend thesis
2	Yonas Girma Abebe	ARARI	Irrigation Engineering	Ready to defend thesis
3	Zewdu Birhane Ayele	ARARI	Agricultural Economics	Completed his studies in 2005/06 academic year
4	Binyam Desta Degaga	ARARI	Agronomy	Attending first year classes and writing proposal
5	Muluken Bantayehu Nigatu	ARARI	Plant Breeding	Attending first year classes and writing proposal
6	Demrew Wesenyeleh Gossa	BoARD	Agricultural Extension	Ready to defend thesis
7	Getaneh Wubalem	BoARD	Agricultural Economics	Ready to defend thesis
8	Tadesse Beyene Engda	BoARD	Agricultural Economics	Attending first year classes and writing proposal

Table 11. MS students who are through with their thesis research and expected to complete studies in the 1st and 2nd quarter of 2006

Name of student	Study program	Thesis proposal title
Bitew Genet Tassew	Soil and Water Engineering	Status of Small Scale Irrigation Projects in Amhara Region: The case of Adrako Micro-Earth Dam
Demrew Wossenyeleh Gossa	Agricultural Extension	Adoption of Improved Chicken Breed and its Management Practices in Rural Ethiopia: The Case of Tehuledere and Dessie zuria woredas of South Wollo
Getaneh Wubalem Meshesha	Agricultural Economics	Determinants of Farmers' Participation in Contract Farming: The case of bread wheat production in Wonbera district, Amhara National Regional State
Yonal Girma Abebe	Soil and Water Engineering	Spatial Structure and Mapping of Top Soil Salinity of Yellen-Jeweha Areas in North Shewa Zone of the Amhara Region

Under its institutional capacity building program, the AMAREW Project is currently supporting studies of 23 BS and 8 MS degree aspiring students drawn from its three major local partner institutions - ARARI, BoARD and EPLAUA. In the reporting year only one BS student has withdrawn from MU for forcing reasons, whereas one MS aspiring student could not join MU for yet unspecified reasons due to the student and one other could not join the School of Graduate Studies (SGS) at MU due to a delayed placement request associated with resignation and delayed replacement recruitment.

A point of interest to note in Table 11 is that all MS thesis research work are done on regional agricultural development problems and are believed to assist in the development endeavors of the ANRS. Beyond that, an important outcome of the long term training is that it contributed to overcome the frequent staff turnover syndrome that characterized both ARARI and BoARD that naturally place their workers in remote, sometimes inaccessible areas with poor social service provisions. In addition to serving an incentive for experienced staff to remain on duty, the program has improved staff ability to do the work in which they are already engaged or to prepare them for new assignments for which a need has arisen.

One outstanding issue requiring the attention of the Project and the Regional Implementation Team (RIT) is the case of BS students who joined University summer program studies in the reporting year. These ones may further require three summers and one regular year study, which may take the completion of their BS degree study well beyond 2007, the anticipated AMAREW project termination year. How these students should be assisted to finalize their studies once the Project has come to close is still a pending issue requiring the attention of the Project and the RIT. The project may not accept any new sponsorship hereafter.

6.2.3 Support to non-project sponsored MS thesis work

Vernonia is a crop with export potential and considered to have possible future positive contribution to food security in the ANRS. An MS student at Alemaya University, Mr. Abebe Tefera, is pursuing his thesis research 'Effect of Plant Spacing on the Yield and Yield Related Traits of *Vernonia galamensis* (Cass.) Less var *ethiopica* M. G. Gilbert' in the ANRS. Being a self-sponsored student, the subject had to work under extreme financial constraint to complete his research. Owing to the crop's potential to improve rural household livelihoods, and the lack of research generated information on vernonia, the FSPCDPO and ARARI, two major partner institutions of AMAREW Project, considered the research highly relevant, and requested AMAREW to financially support the thesis work. After examining the approved proposal, visiting the already established research field, discussing with the thesis advisors, and investigating compliance of the research work with the Project objective of promoting market-led rural development in the ANRS, AMAREW partly supported the thesis work.

6.3 Short-term and on-job training

These trainings are meant to equip employees of partner institutions and the ultimate beneficiaries of the project, the farmers, with the required KSA to attain the much sought farm household productivity and production increase. These training programs were organized at three levels. Level one aimed at imparting practical knowledge and skill to help researchers and extension staff to engage in demand driven and farmer participatory technology generation, evaluation and dissemination process. Level two aimed at creating forums for researchers, extension workers and farmers to come together and exchange thoughts and feedbacks. The third element, which may be considered the major one, deals with empowering farmers by equipping them with the required KSA to demand technologies and make proper use of technologies made available to them through extension interventions. Activities under this category though may seem isolated; have complementarities and are targeted to achieve one common goal - improving the productivity and production of major crops and livestock with meaningful impact on rural households' livelihoods in the context of improving the management and use of the severely degraded natural resource base. The trainings planned and executed in view of attaining the above goals are presented below. However, note should be taken that what is presented below does not give a complete picture of what has been achieved under the training component of AMAREW project in the reporting year. This is because, training being a cross-cutting component, what has been done under this program is reported by the three other project components and is omitted from here to avoid redundancy.

6.3.1 Starter support for novice research workers

Due to the staff turnover syndrome and/or continuous expansion, ARARI like the other Ethiopian National Agricultural Research System (NARS) continuously recruits fresh young graduates to fill vacated or new research posts. Such newly recruited research staffs though, in the best of the cases, are imbued with technical knowledge, lack experience and motivation to develop an effective research program, or even to

apply effectively the existing fund of knowledge already available to the region's specific agricultural development needs. Experience has shown that pursuing work without a starter training support has, for such fresh graduates, proved in their initial employment period to be just like 'walking in the dark'. Related to this current developments in Research-Extension (R-E) linkage thinking advocate the necessity of starter training support to incipient R-E workers because such aspirant R-E workers generally join research organizations with limited understanding of the research system, interdisciplinary team work, research methodologies, and proposal and report writing. It is, therefore, incumbent on the research organization itself to change these situations to ensure that its professional staff will be competent right from the beginning and be concerned with the regional as well as national agricultural development needs.

In line with the above, the Project and ARARI organized a one-month long module based inductive training, which is the first of its kind in Ethiopia, which was offered from 25 July to 26 August 2005 to 45 junior agricultural research workers recruited and allocated to ARARI's seven research centers (Table 12). All but a few were fresh graduates expected to assist or even conduct R-E work on their own in the areas of crop, livestock, natural resources, socioeconomics and extension.

Over 15 experienced and knowledgeable resource persons were drawn from the Ethiopian Institute of Agricultural Research (EIAR), the International Food policy Research Institute (IFPRI), the Swedish International Development Agency (SIDA), ARARI, and AMAREW proper to offer training courses on topics under the following thematic areas:

- Problem and opportunity diagnosis and research planning because the incipient researchers must learn to identify significant problems in their respective fields that limit production; they should also understand the social, economic, cultural and institutional environment in which the small-scale farmers they intend to serve operate;
- Ability to work in an interdisciplinary team as this is an aspect of agricultural research that receives little attention during University training. As a starter research worker, junior scientists tend to be discipline oriented rather than problem oriented and may not properly perceive that research projects of practical relevance to small-scale farmers are those that are essentially multidisciplinary;
- Research methods and experimentation in crop, livestock, natural resources, socioeconomics and extension with more practical orientation to what they have learned in Universities. This is to avoid the wasted funds and efforts that result from poorly designed and executed field experiments and the advancing of unwarranted conclusions that may fail to be relevant to farmers;
- Research proposal and scientific paper writing with emphasis on choosing appropriate experimental designs and minimum set of information to be collected to generate acceptable scientific paper;
- Overall orientation about Ethiopian NARS and the International Agricultural Research system, including Government policy on research, review of research

status in specific disciplines, prevailing research gaps, sources of secondary information, etc.

A post training evaluation done by ARARI and AMAREW staff observation showed that the incipient R-E workers had gained confidence and a better understanding on research problem identification, preparation and evaluation of research proposals designing experiments and field implementation of research projects. A high level of satisfaction was reported in view of relevance of the inductive training in bringing on-board junior research staff with confidence, sense of purpose and urgency (Figure 12).

Table 12. Beneficiaries of the inductive training and their ARARI work station

Inductive training beneficiaries	Work center	Number of staff trained
By work center	Adet	10
	Sekota	7
	Debrebirhan	4
	Sirinka	8
	Gondar	9
	Andasa	4
	Bahir Dar	3
By field of research	Crop	20
	Livestock	10
	Natural resources	8
	Socioeconomic and extension	7
Total		45



Figure 12. Certificates of completion were awarded at the conclusion of the Inductive Training, AMAREW Project Headquarters, August 2005

6.3.2 Preparation of a training module

As per the agreement made with resource persons who offered the inductive training described above a resource material prepared in a more or less module format has been obtained for the various topics covered. As inductive training should be a continuous process, in view of minimizing training cost and making inductive training part of the regional research institute value system, an initiative has been taken to organize all resource materials in a ready to use module format. Computer processing has been started by the Project's training component advisor, and with a support from ARARI staff, training modules for each topic should be finalized in 2006.

COLTA training

Researchers giving skill training to extension workers

Up-grading knowledge and skills of development workers and farmers

Educational or motivational tours

6.4 Other activities

As 50% of his employment terms are to work as an FtF coordinator, the Training Component Advisor had an intensive correspondence with the FtF coordinator and recruiter from the Virginia State University (VSU) side. Based on the understanding he had and using the information generated by the ex-FtF Coordinators from the VSU and AMAREW Project side, the current Training Advisor and FtF coordinator has developed and submitted 10 possible FtF projects with detailed SoW developed for four of them (Table 13). All have been submitted to the FtF program coordinator at VSU and the volunteer recruiter. The SoWs have also been submitted to ARARI, BoARD, and local partners of AMAREW Project and beneficiaries from the program for comments and suggestions. Through the FtF coordinator at VSU, USAID/Washington had also a chance to comment on the detailed SoW.

After further advancement to the extent of recruiting volunteers,, it later came to our attention that USAID, the sponsor of the program, has no interest to work with any public sector as hosts to FtF assignments. All FtF assignments have, therefore, to be directed to the private sector and NGOs which should be the hosts for any agreed upon assignment. Briefing has been given to the FtF coordinator in Addis Ababa by Dr. Wondi Mersie, FtF program coordinator at VSU, who was in Ethiopia for a *Parthenium* IPM Planning Workshop. To comply with USAID requirements, effort has been made and contacts established with AMSEIDA and Cooperative Promotion Agency regarding directing FtF volunteers to the private sector and NGOs.

Table 13. Proposed FtF assignments by AMAREW Project and its local partners

Assignment No.	Assignment titles	Remark on SoW
AMAREW 01/2006	Introducing Crop Performance Assessment Models and Methodologies	Partly developed
AMAREW 02/2006	Aquaculture Development, Production and Marketing Opportunity Analysis	Partly developed
AMAREW 03/2006	Quality Honey Production and Marketing Opportunity Analysis	Partly developed
AMAREW 04/2006	Determination of On-Farm Potato Seed Tuber Production and Marketing Opportunities	Fully developed
AMAREW 05/2006	Assessment of Opportunities and Design of Practicable Improved Management Schemes for Livestock with Emphasis on Feed Production and Management	Fully developed
AMAREW 06/2006	Assessment of improved small-ruminant (sheep and goat) rearing and marketing opportunities	Fully developed
AMAREW 07/2006	Analyzing Opportunities for Promoting Horticultural and Fruit Producing and Marketing Constituencies with Emphasis on Possibilities for Export Trade	Fully developed
AMAREW 08/2006	Domestic and Export Market Opportunity Analysis of Marketable Commodities from the Amhara National Regional State	Partly developed
AMAREW 09/2006	Analysis of Existing Arrangements in Rural Innovation (Research-Extension Linkages) and Recommending Appropriate Institutional Arrangement that Promote Collective Action	Partly developed
AMAREW 10/2006	Analysis of Small-Scale Poultry Production System in View of Suggesting Adaptable Systems of Production that Result in Increased Quantity and Quality of Output	Partly developed

ANNEXES

Annex 1. List of AMAREW Project Staff in 2005

No.	Name	Gender	Education Level	Position	Remarks
1	Brhane Gebrekidan	M	PhD	CoP and Senior Research Advisor	
2	Fekadu Yohannes	M	PhD	Research Advisor	
3	Elias Zerfu	M	PhD	Training Advisor	Until May 2005
4	Eshetu Mulatu	M	PhD	Training Advisor	From August 2005
5	Habtemariam Kassa	M	PhD	Extension Advisor	Until Feb. 2005
6	Yacob Ashine	M	MS	Extension Advisor	From May 2005
7	Yitayew Abebe	M	MS	WS Mg. Advisor	Until Nov. 2005
8	Ahmed Ayele	M	BA	Finance and Admin. Officer	From August 2004
9	Achamyesh Mengstie	F	Junior College Diploma	Senior Secretary	From January 2005
10	Aster Tekalign	F	Junior College Diploma	Secretary/Receptionist	
11	Dereje Bihonegn	M	Diploma	Driver	From April 2005
12	Nebiyu Mussie	M	Diploma	Driver	Until July 2005
13	Yitayeh Endalew	M	Diploma	Driver	From Sept. 2005
14	Beyene Negash	M	Diploma	Driver	Until Dec. 2005
15	Fasika Desta	F	Completed 12 th Grade	Office Assistant	
16	Yehizbalem Gebeyehu	F	Completed 5 th Grade	Janitor	
17	Debebe Tadesse	M	Completed 12 th Grade	Supervisory Security Guard	
18	Alem Deribe	M	Completed 6 th Grade	Security Guard	
19	Teshome Mengistu	M	Completed 12 th Grade	Security Guard	

Annex 2. Acronyms

ACSI	Amhara Credit and Saving Institution
AMAREW	Amhara Micro-enterprise development, Agricultural Research, Extension and Watershed management
AMSEIDB	Amhara Micro and Small Enterprises and Industries Development Bureau
ANRS	Amahra National Regional State
ARARI	Amhara Regional Agricultural Research Institute
ARWS	Animal Range and Wildlife Sciences
AU	Alemaya University
BDU	Bahir Dar University
BoA	Bureau of Agriculture
BoARD	Bureau of Agriculture and Rural Development
BoFED	Bureau of Finance and Economic Development
CAHW	Community Animal Health Workers
CIP	Centro International de la Papa
COLTA	Community Organization Leadership Training for Action
CoP	Chief of Party
CPB	Cooperatives Promotion Bureau
CRSP	Collaborative Research Support Program
CWMO	Community Watershed Management Organization
DA	Development Agent
DCHS	Dryland Crop and Horticultural Sciences,
DU	Debut University
EARO	Ethiopian Agricultural Research Organization
EIAR	Ethiopian Institute of Agricultural Research
EPLAUA	Environmental Protection, Land Administration and Use Authority
EWMA	Extension Watershed Management Advisor
FA	Farmer Administration
FFS	Farmers' Field School
FREG	Farmer-Research-Extension Group

FSPCDPO	Food Security Program Coordination & Disaster Prevention Office
FTC	Farmer Training Center
GIS	Geographical Information System
ICM	Integrated Crop Management
IR	Intermediate Result
ISP	Integrated Strategic Plan
IWDMT	Integrated Watershed Development and Management Team
LaRMEP	Land Resource Management and Environmental Protection
MED	Micro Enterprise Development
MoARD	Ministry of Agriculture and Rural Development
MoFED	Ministry of Finance and Economic Development
MoU	Memorandum of Understanding
MU	Mekelle University
NGO	Non Governmental Organization
NREM	Natural Resource Economics and Management
NRM	Natural Resource Management
OIRED	Office of International Research, Education and Development
PA	Peasant Association
REFAC	Research Extension Farmer Advisory Council
RIT	Regional Implementation Team
SARC	Sirinka Agricultural Research Center
SGMP	Small Grants and Mentorship Program
USAID	United States Agency for International Development
VSU	Virginia State University
WA	Watershed Association
WOARD	Woreda Office of Agriculture and Rural Development