Abstract – Combating desertification is an extremely important but difficult task in affected developing countries, where the work usually involves hundreds and thousands of small farmers and herd owners, and where the government manpower and resources are limited. Many of the degraded land rehabilitation projects or programs have been hampered or have failed because of the incorrect or absent approaches. This approach has similar strategies with the UNCCD Ten Year Strategies that are to create global benefits, to improve affected ecosystem, to improve the livelihood of affected populations, and to mobilize resources. The strategies of this approach are: i) degraded land rehabilitation, ii) livelihood improvement, iii) human resources improvement, iv) participation at all levels and sustainability; and v) integration of all strategies.

The integrated participatory watershed rehabilitation approach seeks to develop a powerful tool for local communities/administrations and relevant bodies. This tool enables to manage degraded lands, like rangelands, forests and agricultural lands, to take decisions on water use and planning, implementation and monitoring of project activities with all stake holders that lives in the watershed area.

Keywords – Land Degradation, Watershed Rehabilitation, Participation, Integrated

1. Introduction

Land degradation is described in many ways such as given below: Land degradation is a process and it occurs when one process, or a combination of processes, cause a reduction of the potential productivity of land resources (Svenson, 2005: 2). The decline in quality of natural land resources commonly is caused through improper use of the land by humans. It encompasses soil degradation and the deterioration of natural landscapes and vegetation and includes the adverse effects of overgrazing, excessive tillage, over clearing, erosion, sediment deposition, extractive industries, urbanisation, disposal of industrial wastes, road construction, decline of plant communities and the effects of noxious plants and animals (IUCN, 2002: 14). Land degradation is the consequence of a complex, wide-ranging suite of processes that exert pressure on land and resources, land degradation is defined by the FAO as a “process which lowers the current and/or potential capability of soil to produce goods and services” (Bowyer et al., 2008: 1). According to the United Nations Environmental Program (UNEP) the definition of desertification is land degradation that is caused by human and climatic factors in arid, semi-arid, and dry sub-humid areas.

Desertification/land degradation is a global issue, with serious implications worldwide for biodiversity, eco-safety, poverty eradication, socio-economic stability and sustainable development. Watershed and land degradation problems grow with population and time. Their management tasks are almost endless. Watershed and land rehabilitation issues are a continuous process and no single plan or programme exists to fix them. Each land has social, natural and economic conditions that are special for that region. According to UNCCD, the consequences of land degradation include undermining of food production, famine, increased social costs, decline in the quantity

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and quality of fresh water supplies, increased poverty and political instability; reduction in the land’s resilience to natural climate variability and decreased soil productivity (WMO, 2005: 8). Dry lands are already fragile. As they become degraded, the impact on people, livestock and the environment can be devastating. Some 50 million people may be displaced within the next 10 years as a result of desertification (UNCCD). The issue of desertification is not new though — it has played a significant role in human history, contributing to the collapse of several large empires, and the displacement of local populations. But today, the pace of arable land degradation is estimated at 30 to 35 times the historical rate.

- 2.6 billion people depend directly on agriculture, but 52% of the land used for agriculture is moderately or severely affected by soil degradation.
- Land degradation affects 1.5 billion people globally.
- Arable land loss is estimated at 30 to 35 times the historical rate.
- Due to drought and desertification each year 12 million hectares are lost (23 hectares/minute!), where 20 million tons of grain could have been grown.
- 74% of the poor (42% of the very and 32% of the moderately poor) are directly affected by land degradation globally (UNCCD).

Successful programs and projects in land rehabilitation are scarce because land rehabilitation is a complex and difficult task. Three generations of watershed rehabilitation projects exist in Turkey. The first generation projects in Turkey between 1940s and 1980s gave priority to protection of downstream assets and erosion control works by adopting engineering solutions. Second generation watershed rehabilitation projects and programs in Turkey and developing countries focused on problems of the natural resources management and poverty reduction in uplands, using farming system and participatory approach. Third generation watershed rehabilitation projects did not just focused on natural resources management and poverty reduction but also focused on environmental pollution problems and creating global benefits as UNCCD’s 10 year-strategies.

### 2. Factors Driving Land Degradation

Land degradation depends on several factors and degradation is the consequence of physical, chemical and biological shifts driven by environmental, social and economic pressures. These drivers can be grouped as below:

- **Natural Drivers**
  - Drought climate conditions
  - High erodibility of soils and geographical features
  - Steep topography
  - Low land cover rate
  - Deforestation

- **Social Drivers**

- **Policy and Institutional Drivers**
  - Inappropriate government policies
  - Lack of the required policies
  - Lack of coordination in and between agencies
  - Insufficient technical capacity and trained staff
  - Inadequate attention to participatory approaches

To mention land degradation and causes in Turkey; soil erosion in particular is a major issue; it is a slow process that results from a combination of natural fragility, and lack of effective land management, driven mainly by policy and institutional factors related to deforestation, crop and livestock production, as well as management of water resources. Deforestation to meet increasing timber, fuel and fodder demands, together with overgrazing of rangeland, farming of steep slopes, and the lack of effective soil conservation practices on agricultural land have resulted in widespread degradation of land and water resources. Also, Turkey’s predominantly semi-arid climate makes the country sensitive to degradation (NBMS, 2010: 10).

### 3. The Use of Integrated Participatory Approaches in Watershed and Land Rehabilitation

Integrated participatory approaches and community watershed management plans have been widely used, with varying success, to reconcile the overlay of human activity on naturally defined watersheds. In general, these integrated participatory approaches were employed to establish micro-watershed management plans.

The participatory processes succeeded where there were common purposes that could interest all or most of the population, as in the India Hills Project and where the participatory process was flexible and provided for capacity building and genuine empowerment, for example, in Turkey, and where there were income and livelihoods incentives. Where communities could see the economic benefits and were empowered, they were willing to invest in long-term conservation. Participation does not, however, guarantee specific outcomes, and it is not a neutral concept: it involves shifts in decision-making power between the state and local communities, and also between different segments of the local community (Darghouth et. ...
Participatory processes therefore have to be designed for the specific development and distributional outcomes intended. Participatory approaches impose a demanding set of requirements: political commitment and equitable rules, time for the process to mature, careful sequencing, inclusion of all stakeholders in the process, public agencies that understand the rationale and process of participation, and sustained capacity building at all levels, for both stakeholders and public agencies (Darghouth et al., 2008: 14). The overall of this approach in Turkey is to prevent further progression of the vicious spiral consisting of watershed degradation and poverty, to create global benefits for future generation. In order to accomplish the overall goals, the following policies can be established:

- Natural resources rehabilitation, management and utilization
- Livelihood improvement
- Human resources development

The Planning process has a crucial role in this approach. The plan for the watershed rehabilitation should consider the needs and decisions of private farmers, herd owners, local communities and all the stake holders. All stake holders will be affected by rehabilitation activities. Therefore, planning from the bottom up is necessary. All the stake holders’ problems, constraints and needs can be well reflected in a realistic plan using integrated participatory approaches. Many land/watershed rehabilitation projects have failed because the local community was not included in the planning, implementation, monitoring and evaluation.

The following are some strategies that can be used in developing countries to bring local people or grass-root options into watershed rehabilitation (Sheng, 1990: 18).

- Identify focal groups such as villagers and farmers that are negatively affected from watershed activities.
- Include representatives of existing local and national organizations and interest groups (such as farmers’ unions, forestry and agriculture agencies, women’s organizations, cooperatives, etc.) in the each step of the planning activities.
- Study local systems and develop models for the local people,
- Help local people organize soil conservation or watershed districts to assist in planning watershed districts to assist in planning as well as in implementing the planned work.
- Conduct sample surveys on socio-economic conditions of locals including their opinions on soil erosion, preferable conservation measures, and their targets.
- Study local farming systems and develop farm models for estimating conservation needs and goals in a project area. Establish village "interface teams", conservation headmen, or contact farmers to reflect from time to time the conservation needs of the villagers.
- Establish teams such as afforestation, rangeland rehabilitation, irrigation, beekeeping etc. to contribute the implementation of the watershed plan.

The characteristic of the respective areas of the catchment vary significantly in terms of the bio-physical and social features; these following programs and projects which should be identified during planning terms with join of the all stakeholders should not be uniformly implemented in all areas of the catchment, but selected in relation to the actual situations and need of the respective areas.

### 3.1. Integrated Participatory Watershed Rehabilitation Approaches in Turkey

Turkey has built on local and regional experience to formulate policies for community based watershed management in poor upland areas. The Turkish rural economy has been characterized by a high incidence of poverty, particularly in upland areas. The consequent growing pressures on forests and pasture have reduced vegetative cover and diminished soil fertility and the carrying capacity of rangeland. This has contributed to reductions in infiltration rates and to increases in peak river flows, flooding, and sedimentation problems.

Beginning in the late 1980s, Turkey tested an integrated and participatory approach to watershed management in a number of micro-watersheds, and from 2004 expanded the approach to three major river basins (Eastern Anatolia, Kizilirmak, Yesilirmak). Policy is now based on a community-driven approach to natural resource management, integrating forestry, soil and water conservation, and crop and livestock production (NBMS, 2010: 17).

The government shares the cost of a mutually reinforcing package of resource use productivity enhancing and conservation measures. This policy has driven institutional change, particularly the coordination and integration of the activities of different government departments at the micro watershed level and the development of watershed-based forest resource management plans.

#### 3.1.1. Integrated Development at Basin Level: GAP Project

The Southeastern Anatolia Project (GAP) - started in 1980 - is a very important multi-purpose integrated development project, aimed at achieving local economic and social development, initially through farming with extensive irrigation systems and electricity generation, and later expanded to cover agriculture, industry, transportation, urban and rural infrastructure, health care, education, housing and tourism. It is one of the biggest investments in Turkey of the last century involving 13 major projects undertaken by DSI, extends over a surface area of 75,000 square kilometers, and covers the lower parts of the Euphrates and Tigris Rivers as well as nine provinces with a total population of 6.7 million.

With an estimated cost of 32 billion dollars, the GAP involves a total of 21 major dams and 19 HEP generating stations, as well as irrigation networks to irrigate 1.7 million hectares of land. The centerpiece is the Atatürk Dam,
which was completed at the beginning of the 1990s, with a total storage capacity of 48.7 billion m³, and an installed electricity generating capacity of 2,400 MW.

The design of the program was premised on the fact that the sustainable development of the region’s soil and water resources will provide a basis for agricultural development, with substantial diversification in production output and increase in productivity, which, in turn, will stimulate the growth of agro-related industries, and the rapid increase in incomes and standard of living of the local population.

3.1.2. The Eastern Anatolia Project (1st generation watershed rehabilitation project)

Eastern Anatolia Watershed Rehabilitation Project (EAWP - 1993-2001) the Government introduced a more holistic and participatory approach to natural resource management on a watershed basis in eleven provinces, with positive effects on the status of natural resources as well as household incomes.

The overall objective of the project was: sustainable pastureland, forest and farming at upper basins, prevention of soil loss & destruction & erosion, diminishing sedimentation in reservoirs, income generation & poverty eradication. Project components were: basin rehabilitation and management, and applicable research on in-situ gene preservation (NBMS, 2010: 32).

A key feature of the project was interagency coordination of activities at micro-catchment level. Implementation of the Eastern Anatolia Project was the first time that different departments and bureaus, such as soil and water conservation, agriculture, livestock and animal husbandry, environment, and forestry, made joint efforts in planning and implementing integrated watershed development works. Overall, the program helped to build institutional development that was not only within the implementing agencies, but also at the local level (involving community leaders and farmers).

This resulted in positive outcomes, including increase in rural incomes and reduction of natural resource degradation, and allowed the Government to use the lessons learnt to introduce further innovation and to expand the program to other parts of the country. Some of the new features, which were introduced in the second generation of World Bank-supported projects (the Anatolia Watershed Rehabilitation Project (2004-2012) focused on water quality and river basin planning (NBMS, 2010: 18).

3.1.3. Anatolia Watershed Rehabilitation Project (2nd generation watershed rehabilitation project)

The Anatolia Watershed Rehabilitation Project was a second generation watershed rehabilitation combined conservation, intensified resource use and livelihood objectives. The project development objective was to introduce sustainable natural resource management practices in 28 degraded micro catchments and thereby raise incomes of communities affected by resource degradation. This project also focused on water quality.

Project components were: i) Rehabilitation of destructed natural resources, ii) Income generating activities, iii) Strengthening policy and regulatory capacity towards meeting EU standards, iv) awareness raising, capacity building and replication strategy, v) project management and support services.

A noteworthy feature of project design was that the micro-catchment plans were to be developed on a rolling basis. Such sequencing provided an opportunity to assess performance of previous plans, gauge “what works” and “what doesn’t”, and feed this knowledge into the next round of MC plans. Also, a flexible approach was adopted to revise micro catchment plans as necessary to respond to changing circumstances and evolving needs of communities. The project design included new and innovative approaches to address natural resource rehabilitation and management on a watershed basis. Agricultural pollution control and animal waste management for nutrient reduction to soil and water bodies in the MCs of the Black Sea provinces had not been tested by the Government before (AWRP, 2012: 6). In this project it was aimed to decrease the pollution levels of underground and surface waters caused by livestock activities and the use of fertilizer and pesticide in agricultural areas, which would lead to the decrease in nutrition material carried into the seas. It was aimed at monitoring water pollution, supporting organic agricultural activities, replicating these activities country-wide and contributing to the implementation of the EU Nitrate Directive (CRWRP, 2012: 1).

In all, two ministries -ministries on forestry and agriculture- and seven directorates were directly involved in Project implementation. These challenging implementation arrangements were justified as Project activities were cross-sectoral, covering a broad spectrum of interventions related to agriculture, livestock, forestry, and environment. The Responsibilities of each ministry/directorate were clearly spelled out so that there was no ambiguity with “who does what” during implementation. Additionally, for each micro-catchment, a micro-catchment implementation team (MCIT) was established with relevant staff from all seven provincial directorates to assist communities in developing micro catchment plans. Establishing a MCIT was a useful institutional arrangement as communities had limited knowledge and skills for collective action on natural resource rehabilitation, environmentally friendly agricultural practices and animal waste management.

3.1.4. Çoruh River Watershed Rehabilitation Project

The Çoruh River Watershed Rehabilitation Project’s study area covers Çoruh River catchment which has a total area of about 2 million ha. The catchment is located in the northeast of Turkey, south of the Black Sea and next to the national border with Georgia, and ranges among the three provinces. It is a similar project to the previous projects but in this project it was also aimed at replicating and contributing to the solar power panels and micro-hydroelectrical systems which are renewable energy resources in order to reduce the use of fossil fuels. The
Project with its local and national scale justifications is directly related to the global level problems such as climate change and desertification/land degradation.

Due to the heavy erosion in the watershed, there is strong risk of quick filling in a short time period and decreasing in economic lives of the completed, under construction and planned dam reservoirs. Therefore, watershed rehabilitation activities were targeted to be conducted in the region. It is one of the regions where natural disasters such as avalanche and floods occur frequently.

The problems and constraints for watershed rehabilitation in the Coruh River catchment, in relation to factors of natural conditions, social conditions, economic activities, and institutions and organizations are summarized below.

• Natural conditions:
  – steep topography with southern aspects,
  – harsh climates with intensive storms and seasonal bias of rainfall,
  – high erodibility of soils and geographical features,
  – rapid river flows and floods.

• Social conditions:
  – rural poverty,
  – uncertain land tenure,
  – limited employment opportunities,
  – poor social infrastructures.

• Economic activities:
  – low agricultural productivity,
  – inadequate silvicultural practices and management planning,
  – little support for potential economic activities such as apiculture and eco-tourism,
  – Inconsistent marketing systems and poor market information for agricultural products.

• Organizations and institutions:
  – lack of coordination in and between agencies,
  – insufficient technical capacities and trained field staff,
  – lack of information and applied research on agricultural productivity and complete absence of scientifically-based assessment of the erosion control activities,
  – insufficient attention against participatory approaches.

The overall goal of the Project is to prevent further progression of the vicious spiral consisting of natural resources degradation and poverty of forest villagers. In order to accomplish the overall goals, the following policies should be established.

• Policy - A: Natural Resource Rehabilitation, Management and Utilization
  – Sustainable conservation of existing forests and rehabilitation of degraded forest areas to provide multiple benefits, with particular attention to meeting needs of local populations.
  – Undertaking the required soil conservation measures on critical non-forest lands, which create serious damage or threaten lands, infrastructures and people of lower catchments.
  – Improving conditions, productivity and sustainable utilization of the rangelands.
  – Rehabilitation of streambeds and improving water resources utilization.

• Policy - B: Livelihood Improvement
  – Strengthening of livestock sector with regard to its comparative advantages. Increasing productivity mainly through securing winter feed and improved breeding.
  – Increasing income from crop production by productivity improvement and introduction of high-profitability crops. Promotion of maintenance of agricultural infrastructures.
  – Diversification of agricultural income sources, through promotion of products with high market values such as regional special products.

• Policy - C: Human Resources Development
  – Strengthening the capacities of the stakeholders to understand the linkages relating sustainable natural resource management to human livelihoods, and implementation of effective village-level activities which simultaneously improve both.

The Proposed programs and projects are summarized below. As the characteristics of the respective areas of the Çoruh River watershed vary significantly in terms of bio-physical and social features, these programs/projects should not be uniformly implemented in all areas of the catchment, but selected in relation to the actual situations and needs of the respective areas. Moreover, since the sole effects of the individual programs/projects are not sufficient for realizing the overall goal of the Project, the implementation of packages of programs/projects, where they are mutually combined and related, will be necessary.

A. Natural Resources Rehabilitation and Management

A.1. Multipurpose (functional) forest management planning project
A.2. National parks and protected areas management project
A.3. Nursery expansion and improvement project
A.4. Soil conservation project
A.5. Afforestation project
A.6. Rehabilitation of degraded high forest project
A.7. Rehabilitation of degraded coppice forest project
A.8. Energy forest plantation project
A.9. Rangeland rehabilitation project
A.10. Riverside Plantation project

B. Livelihood Improvement

B.1. Development of livestock productivity program
  B.1.1. Breed improvement project
  B.1.2. Transformed grazing system project
  B.1.3. Mechanized hay cutting project
B.2. Development of agricultural productivity program
  B.2.1. Irrigation improvement project
  B.2.2. Greenhouse promotion project
  B.2.3. Marketing improvement project
  B.2.4. Fodder production improvement project
  B.2.5. Fruits orchard rehabilitation project
B.3. Development of diversifying income generating program
  B.3.1. Apiculture promotion project
B.4. Strengthening of support system program
  B.4.1. Small scale mechanization development-assistance project

C. Human Resources Development

C.1. Training program
C.2. Awareness creation program
C.3. Research program
C.4. Demonstration program
C.5. Technical assistance program

4. Added Value to the One Health Approach

One Health approach is an integrated approach and also it is a global strategy for expanding interdisciplinary collaborations and communications in environment, public health, natural resources, food security and economy etc.

In this context integrated participatory watershed rehabilitation approach can be approved as tool that contributes to the goal of One Health approach of combating land degradation

5. Conclusions

Land degradation is the consequence of multiple processes that both directly and indirectly reduce the utility of land. Land degradation encompasses soil degradation and the deterioration of natural landscapes and vegetation. It depends on several factors; environmental, social and economic pressures cause land degradation and an approach handling all these factors as a whole can contribute combating with it.

Land-watershed rehabilitation works in the developing countries mostly concentrated on livelihood or just natural resources rehabilitation and neglect participation of local people and other related stakeholders. Mostly, rural people are very poor and dependent on natural resources in these developing countries. A vicious cycle exists between the degradation of natural resources and rural poverty. Degradation of the natural resources causes low level of productivity for the villagers and increases the poverty. Thus, people become more dependent on the natural resources and therefore, natural resources become even much more degraded.

Integrated and participatory approaches help to motivate these people and encourage them to participate in planning. The participatory approach succeeds where the participatory process is flexible and provides for capacity building and genuine empowerment, and where there are income and livelihoods incentives. Where communities can see the economic benefits and are empowered, they are willing to invest in long-term conservation.

In best-practice examples, the institutional framework is focused on the local level, with clear arrangements for integration within permanent agencies and for inter-agency collaboration, as seen in the Turkey Eastern Anatolia Project. After all, this approach is key for solution for combating degradation of natural resources and rural poverty and also to achieve UNCCD ten year objectives.

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