Chapter 6

# Stakeholder Involvement in Sustainable Watershed Management

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Additional information is available at the end of the chapter

http://dx.doi.org/10.5772/55798

## 1. Introduction

### 1.1. Water is a main source of life

Water is a key element for human life and philosophy. Many of the thinkers had considered on this issue and they have produced several theories. For example, Thales' most famous belief was his cosmological thesis, which held that the world started from water. This thesis was the first try to explain how was the beginning of the creation and world, in the terms of the logical and systematical way. On the other side, Aristotle considered this belief roughly equivalent to the later ideas of Anaximenes, who held that everything in the world was composed of air. The best explanation of Thales' view is the following passage from Aristotle's Metaphysics (Anonymous, 2012a). The passage contains words from the theory of matter and form that were adopted by science with quite different meanings. "That from which is everything that exists and from which it first becomes and into which it is rendered at last, its substance remaining under it, but transforming in qualities, that they say is the element and principle of things that are." Again: "For it is necessary that there be some nature, either one or more than one, from which become the other things of the object being saved... Thales the founder of this type of philosophy says that it is water". A deeper dip into the waters of the theory of matter and form is properly reserved to other articles (Anonymous, 2012a). Thales taught as follows: "Water constituted the principle of all things." Heraclitus Homericus states that Thales drew his conclusion from seeing moist substance turn into air, slime and earth. It seems likely that Thales viewed the Earth as solidifying from the water on which it floated and which surrounded Ocean (Anonymous, 2012b). On the other hand, Heraclitus said, "everything in life is changing and will change too". He is famous for his insistence on ever-present change in the universe, as stated in the famous saying, "No man ever steps in the same river twice". This quote is the famous speech about waters and river in the philosophy.

On the other hand, problems about the water should be necessarily solved and it is very important for human life. The main problem about water is permanent since the human history. In the right term humans are the main factor of the problems about water and rivers, they have been effected by these problems in the first hand, but in the same time humans are responsible about to solve these problems The most challenging activity about water is the shape and nature of the water. Water can break walls, buildings and cities. Besides this destructive nature of the water, humans need water for sustaining their lives too. They need it, to irrigate their fields for producing crops, to drink when they are thirsty. For solving this, problems humans need to improve their calculations and they try to find a suitable solution for these situation. A first innovative and qualitative solution in math has been established in this period, in the field of the geometry (Deauna et al., 2000). Because of them the earliest branches of Mathematics. Beginnings of the geometry can be traced before 1700 B.C. or in early ancient Egypt. Due to necessity, every time the Nile River inundated and deposited fertile soil along the bank, the early Egyptian had to solve the problem of size and boundaries of land along the Nile River. Changes happened in the contour of the land had caused confusion among landowners. Therefore, a system of making boundaries, measuring lengths and areas had to be discovered (Deauna et al., 2000). From this circumstance, the name "Geometry" has evolved. The word "Geometry" originated from the word "Geo" means "earth" in Greek and "metros" means "to measure" (Deauna et al., 2000).

Many thinkers of the western World could not be stand indifferent to these rules of the nature. They were very proud to these knowledge and they have adopted these knowledge to their societies. These situation is very ironic because today many of the eastern countries are following western World. However, nowadays the source of the knowledge is not matter; every country and every nation in the World want to solve the water problems. Water is the most important source in the World, so water problem is now a global problem and it is a key issue for every individual in the World.

### 1.2. Watershed

A watershed is an area of land where all of the water that is under it or drains off it goes into the same place. John Wesley Powell, geographer and a scientist, put it best when he said that a watershed is: "that an area of land, a bounded hydrologic system, within which all living things are inextricably linked by their common water course and where, as humans settled, simple logic demanded that they become part of a community." (USEPA, 2012). The term "watershed" is commonly used to describe an area of the earth's surface from which water flows downhill to a single outflow point (Anonymous, 2009). Watersheds come in all shapes and size. The area encompassed may either be small, such as that which an ephemeral stream drains only during precipitation events, or be large. Watersheds cross county, state, and national boundaries (Anonymous, 2009). Because of them managing of the watersheds is very sensitive political issue between countries.

Health of the watershed has directly effect on the quality of the water, which drain in the watershed area. In this situation, quality of water is important (Giri et.al,. 2012).

Furthermore, the size and volume of the water are other important indicators of the water management. Maintaining proper water quality conditions is important to protect human, animal, and plant health, and is an on going concern in water resources (Giri et.al,. 2012). Meanwhile, anthropogenic activities such as direct industrial discharges and agricultural practices significantly interfere with natural processes, which ultimately degrade water quality (Giri et.al,. 2012). Natural systems are mainly working on the logic of life cycle. A change in a parameter can be effect all other parameters.

Water quality depends on several physical combinations (Said et al., 2006). Sustainability of these physical components is important. Basically, physical sustainability is the combination of water quality, water quantity and ecological factors (Said et al., 2006). Evaluating the water quality situation within a watershed requires information on physical, chemical, and biological water quality indicators. Unfortunately, for many constituents historical measurements do not exist for most watersheds. In these cases, estimation of these constitutes is necessary from the available data on different, related constituents (Said et al., 2006). Trends of these constituents are very important for complete evaluation and mitigation of water quality problems and in the long-term decision-making processes. Using advanced techniques that construct relationships between water quality constituents makes evaluation and mitigation of water quality problems more reliable (Said et al., 2006).

There are some international tools to protect and improve water quality. One of these tools is European water Framework. This framework is a proper way to combine countries for more sustainable management practices. There are many good examples of the plans that aim to achieve a better understanding of water bodies. To comply with the European Water Framework Directive (EWFD, 2000/60/EC), which requires a "Good Ecological Status" for all waterbodies in 2015, French policy adopted a Phyto-Pharmaceutic Products' or pesticide reduction plan (ECOPHYTO 2018 plan). This program aims at inciting farmers to halve the annual amount of pesticides used. Nevertheless, the question of pesticide transfer is not solved. Presently the "zero pesticide" solution is not achievable for technical and economical reasons. The sociological part of the study highlights the importance of a co-construction process between all involved stakeholders, even if it is time consuming. Theoretical solution should be adapted not only to hydrological aspects but also to the socio-economical context (Tournebize et al., 2011).

Altering the landscape can influence the hydrologic integrity of a watershed. Changes in water quality and quantity that can occur from storm-water runoff include but are not limited to:

- Decreased and/or lack of infiltration to groundwater recharge areas and potential aquifer depletion,
- Decreased seasonal stream base-flows,
- Increased storm water volume and velocity contributing to stream-bank erosion, stream channelization, and more frequent and severe flood events,
- Increased surface water temperatures from heated storm-water runoff and lack of shaded riparian buffers, and

- Decreased filtration of pollutants from narrowing or damaging riparian buffers (Tournebize et al., 2011).

Mitigation of water quality problems requires a number of actions by stakeholders and regulatory agencies. In some cases, especially in locally impaired waters, stakeholders can identify and mitigate water quality problems directly. In the case of significant local or regional pollution, watershed management plans and the total maximum daily loads, issued by USEPA of the Clean Water Act, enhance the water quality situation in impaired watersheds (USEPA, 1991). The total maximum daily load establishes a set of required reductions in target parameters consistent with an implementation policy to protect in stream water quality (Benham et al., 2002). If the water quality continues to worsen or goals can not be achieved under easing condition, it may be necessary to apply point source reductions or best management practices to improve the water quality as a whole. In summary, the water quality component in watershed management integrates scientific knowledge and stakeholder supplied information regarding the watershed-scale social, economic, and environmental processes affecting water quality.

### 1.3. Watershed management

Watershed management is the integrated use of land, vegetation and water in a geographically discrete drainage area for the benefit of its residents, with the objective of protecting or conserving the hydrologic services that the watershed provides and of reducing or avoiding negative downstream or groundwater impacts (Darghouth et al., 2008).

Watershed management is dedicated to solving watershed problems on a sustainable basis. These problems can be classified into five categories: lack of water (quantity), deterioration in water quality, ecological affects, poor public participation, and low output economic value for the investment in water-related activities. The first three categories constitute physical or ''natural'' sustainability while the last two categories define social and economic sustainability. For successful implementation of solutions to the physical and economic issues, a broad, representative array of stakeholders should be involved (Grigg, 1998, Said et al., 2006).

Watersheds are a highly desirable unit for planning because they are physical features ubiquitous across the landscape serving as the geographic foundation for political states. As planning units, watersheds transcend political boundaries. However, prior to the 1970's, most watershed management focused on solving localized problems without taking into account the interrelationship between those problems and the biophysical, economic and social elements of the larger watershed system (Heathcote, 1998). Furthermore, during most of the mid- to late- 20$^{th}$ century, watershed management was, politically, a top-down planning process with national concern pre-empting local (National Research Council, 1999). In the mid-1990s, EPA's Risk Assessment Forum and Office of Water cosponsored the development of five-demonstration watershed ERAs to test application of the ERA Framework (USEPA, 1992) to Office of Water programs. The five watershed assessments were performed in the Clinch and Powell Valley, VA, Middle Snake River, ID, Waquoit Bay, MA, Big Darby Creek, OH, and the Middle [segment of the] Platte River, NE. All five selected sites had valued ecological resources, multiple stressors, an existing data set, and willing assessment participants. Using these assessments, many key aspects of the watershed ERA process, including challenges encountered and lessons learned, documented.

Chess and Gibson (2001) stated that the attributes intrinsic to a watershed management are: scientific feasibility, social feasibility, and motivational feasibility. They considered that these feasibilities are not static attributes although they can be improved through additional efforts to deal with attributes that limit feasibility. Watershed management plans may not be implemented due to lack of support even if the planning process and proposed actions are faultless. However, watershed restoration and protection management are often a complex web of technical, legal, and economic issues involving numerous stakeholders. The ability to address these issues depends on the attributes intrinsic to the watershed and whether they provide sufficient, basis for this innovative approach to watershed management (Chess and Gibson 2001). These attributes are defined by Chess and Gibson (2001) as follows:

1. Scientific feasibility is tied to the nature of environmental problems and the scientific capacity to solve them.
2. Social feasibility encompasses public communications and engagement.
3. Motivational feasibility includes issues related to values or economic consideration (Chess and Gibson 2001).

Scientific feasibility concerns the nature of the environmental problems, the tools to track them, and the methods to improve them. Examples of scientific feasibility related issues are the engineering solutions to improve water quality or conserve water quantity, technological limitations, such as the inability to detect the source of pollution, the absence of obvious causal relationships, and the development of best management practices (Said et al., 2006). In some areas, scientific feasibility may be so limited that management of a given watershed becomes a lower priority than other watersheds in which watershed management is more likely to succeed. Research and strong leadership can increase scientific feasibility to overcome technological barriers (Said et al., 2006). In summary, environmental problems must be measurable and tractable over time in order to predict performance, achieve public awareness, indicate progress towards goals, locate hot spots, take actions when appropriate, and sustain watershed management (Said et al., 2006).

Social feasibility means getting stakeholders involved and utilizing their input in a meaningful process. The National Research Council noted the need for watershed management to ‘‘get the participation right.’’ There are many ways to improve stakeholder partnerships (Said et al., 2006). These include recruiting participants, encouraging leadership, education, civic engagement, and exploring various structural arrangements. Watershed management can be implemented through voluntary participation or facilitated by existing statutory infrastructure. Ideally, all watershed management activities would be driven by voluntary participation because of enlightened self-interest. However, statutory authority is often important because of the authority it grants, the planning it may mandate, and the funding it may provide (Said et al., 2006). Collaborative approaches may not be appropriate for watersheds in which there is limited evidence of social feasibility. If there is lack of social feasibility within a watershed, Federal and state agencies need to recognize that significant effort may be required to build social capacity to compensate for this intrinsic limitation. Agencies can build social feasibility by promoting civic efforts and by following best practices for development of collaborations (Said et al., 2006).

Occurrences of flooding, drinking water contamination, or other threats may increase social feasibility. Motivational feasibility is needed when there is a lack of sufficient income or demographic composition and when tax and donation of funds and time are needed. Motives may fall into three distinct categories: rational (cost-benefit assessment), norm-based (efforts to conform to norms such as pollution remediation), and affective (emotional attachments that are difficult to quantify such as protection of endangered species and non-use values) but are powerful in watershed management. Motivational feasibility is closely linked to social feasibility. For watershed management activities to occur there must be motivation to take action. Motivation can be induced by infusing funds (incentives for watershed projects), increasing values, and improving cost benefit ratios (Said et.al, 2006).

There is some important plan at maintaining progress towards a sustainable watershed. The first one is organizational capacity for a long term. The second one is multi-disciplined, inclusive oversight group. The others are revitalization of existing planning efforts and programs as planning tools for a sustainable future; broadening the scale of future sustainability efforts in the region to include the entire Broad-head watershed; further review and analysis of the regulatory framework affecting sustainable watershed planning efforts, and continuation of an education and outreach effort through social marketing efforts.

## 1.4. Identifying and including stakeholders in watershed management

Among the various ways of identifying stakeholders, as well as in the agency, behavioral, ecological, institutional, resource dependence, and transaction cost theories of the firm, there has been found no single attribute within a given theory that can guide people to a reliably on these issues. However, it was found that one can extract from these literatures the idea that just a few attributes can be used to identify different classes of stakeholders in an environment. Analysis with Freeman's definition of stakeholder is a good point. He stated that-"any group or individual who can affect or is affected by the achievement of the organization's objectives" (Freeman, 1984) and develop a theory of stakeholder identification drawn from these various theoretical literatures. From this point, there can be a broad definition can be explained, so that no stakeholders, potential or actual, are excluded from analysis arbitrarily or a priori (Wamalwa, 2009). Stakeholders are important in the planning of the natural environment where the human activities and natural processes are multi-layered combined. And then, a propose that classes of stakeholders can be identified by their possession or attributed possession of one, two, or all three of the following attributes (Wamalwa, 2009):

1. the stakeholder's power to influence life on the watershed,
2. the legitimacy of the stakeholder's relationship with the watershed region, and
3. the urgency of the stakeholder's claim on the watershed area (Wamalwa, 2009).

This theory produces a comprehensive typology of stakeholders based on the normative assumption that these variables define the field of stakeholders: those entities to whom managers should pay attention (Wamalwa, 2009). This attention is a very important key factor that the sustainability of the watershed management.

According to Mitchell et al., (1997) stakeholders can be classified as "Latent" referring to those who are of low importance to the organization, because they posses only one of the three characteristics (urgency, power and legitimacy) or "Expectant", having a higher importance, than the latent by virtue of being in possession of two of the three qualities or "definitive" having the highest degree of importance to the organization, because they posses all the three features. The latent group of stakeholders can be further classified into three (Mitchell et. al. 1997). Dormant; involving those who have power but of no or little effect to the goal of integration, because they do not have legitimacy and urgency. Discretionary; including those who have legitimacy but have no urgency and power. Demanding; including those who may have the urgency but of low rating because they do not have legitimacy and power (Mitchell et. al. 1997). The expectant group can also be further subdivided into dominant, wielding both high influence and stake or, dependent with high stake and urgency but having low influence, or dangerous with urgency and power (Wamalwa, 2009).

The planning phase for a watershed assessment is especially complex because a watershed typically overlaps multiple jurisdictions that are managed by organizations with divergent goals and responsibilities and inhabited by numerous stakeholders with varied interests. Depending on the perspectives of the stakeholders involved, a different set of goals and objectives may emerge. Stakeholder participation may become complex if there are numerous stakeholders or some of them are interested in only a limited range of issues (Glicken, 2000).

The inadvertent exclusion of a stakeholder group may influence a group's decision to accept or reject the outcome of the process. Excluded stakeholders could even take legal actions, such as filing a citizen lawsuit under the Clean Water Act to challenge the process outcomes. Therefore, stakeholder involvement needs to be balanced against the limited resources available for watershed assessment and management (USEPA, 2001).

Participants in the watershed management process should include all regulatory or resource agencies (state, federal, local) with responsibilities for protecting and managing the water body and any parties whose authority will be needed to implement a management plan (e.g., local and county officials with zoning oversight). Nongovernmental organizations (such as watershed associations or councils, river watch citizen groups, volunteer monitoring group, educational and research institutions, industries, and agricultural associations) all have a stake in watershed management. Besides organized groups, other stakeholders include landowners, those who use the watershed, and those whose participation is essential to successful management. In some instances, stakeholders may be hundreds of miles away from the assessment (e.g., bird watchers concerned about migratory waterfowl). The nongovernmental and unaffiliated stakeholders may have objectives that are very different from those of the regulatory agencies (e.g., minimizing restrictions on land use, resource development, or waste disposal). Although such social, legal, and economic objectives may be in conflict with some environmental objectives, they are still relevant concerns that need to be considered (Stahl et al., 1999). To help assess these tradeoffs, it may be helpful to involve environmental economists.

Participants on a watershed assessment team contribute different resources that include socioeconomic information, historical data, scientific expertise, and assets to conduct the assessment. The Big Darby Creek assessment project is a good example of team studies in the watershed management. Team members of the Big Darby Creek assessment project included biologists, a city planner, and environmental scientists (Cormier et al., 2000). Team members performed literature reviews and frequently consulted or interviewed experts in other disciplines. The team interacted regularly with the Big Darby Partners, a group of state agencies, representatives from The Nature Conservancy, and farmers concerned about the future of the working landscape. Because of them partnership between stakeholders and planners are important factor. Integration between these two groups effect the plan and application.

## 2. Watershed management approaches

### 2.1. Collaborative watershed management

Collaborative watershed management has emerged in the last two decades as a promising approach to address non-point source pollution in waters. With such a wide variety of land-use patterns across watersheds, it is important that collaborative approaches to water resource management are tailored to local land-use planning efforts (Wang, 2001; Scott et. al., 2010). Urban and rural landscapes can have very different biological systems, leading watershed partnerships located in different areas to address different environmental issues. Moreover, collaborative management efforts in each setting can be impacted by different sets of variables, from the level of human capital (e.g., income, education) and social capital (e.g., trust, networks, norms of reciprocity) in watershed communities, to the financial, technical, and human resources made available by government agencies, NGO’s, academic units, and local citizens (Hardy and Koontz, 2010).

Successful collaborative watershed management programs emphasize active stakeholder engagement, employ integrated solutions, recognize the authority of multiple agencies and jurisdictions, and build on expertise and resources across sectors. Out of bio-geophysical necessity, managing a watershed involves coordinated stewardship of the waterbody and the land area that the waterbody drains. Consequently, watershed conservation and rehabilitation is typically a function of an array of public and private programs. Representatives of local, state, and federal agencies; nonprofit group; and for-profit businesses each must bring complementary resources to the task (Golden, 1998). Ideally, collaborative watershed management refers to shared decision-making and implementation by public and private sector partners who share the common goal of conserving or enhancing hydrologic resources (Michaels, 2001).

The collaborative watershed approach is on the agenda of the federal government in the United States. President Clinton's 1998 Clean Water Action Plan explicitly promotes such an approach nation wide. The plan encourages states to work with watershed stakeholders, including interested citizens, to identify watersheds with critical water quality problems and to focus resources and implement strategies to solve these problems (Michaels, 2001).

By collaborating with local entities, states can facilitate ongoing learning; devise systems for measuring, monitoring, and evaluating; and disseminate best practices or model policies. They can actively engage in propagating local experiments. States have instrumental roles to play in achieving Dorf and Sabel's (1998) ideal of democratic experimentalism, where the deliberations and performance of one jurisdiction are considered in like jurisdictions. Since problems are encountered face-to-face at the local level, a critical function of the states is to build local collaborative, managerial, financial, and technical capacity (Cigler, 1998). Recognizing the political palatability of local collaborative management results in emphasizing grassroots strategies, such as community education, and local government tools, such as floodplain zoning (Blatt, 1993).

## 2.2. Holistic watershed management

Embraces the idea that all aspects of the watershed human resources, economic development, environmental quality, infrastructure development and public safety must be considered in a holistic watershed management decision-making process. Holistic watershed management's fundament approach is in a facilitated process designed for the integration of organizations and individuals having environmental knowledge, skills and resources in the water quality and comprehensive community planning.

Consider the following roles agencies could play in sustainable holistic watershed management decision-making:

1. Catalyst–incentives or regulation enforcement to improve watershed environment (Water Quality). Agency representative living in the watershed experiencing a problem.
2. Responsive/Supportive–provide technical resources as needed for sound holistic watershed management decision–making.
3. Stand back and let local people control the holistic watershed management planning process (UOEWQP, 2004).

## 2.3. Integrated watershed management

Previous water management efforts that were sectoral, technological and centralized have proved inadequate, because they failed to recognize and appreciate the intricacies and inter-relations of ecosystems (Pereira, 1973). Consequently, integrated watershed Management has been suggested as a solution and has been tried for decades in several countries in the world (Bowden, 1999; Mitchell, 1990; Bulkley, 1995; Lant, 1999; Pereira, 1973).

An "integrated watershed management" approach should strive to create settings for collaboration and innovation by facilitating dialogue among local stakeholders. The over-riding charge under the piloting of this approach is fostering a framework for dialogue among stakeholders for problem solving examining interdisciplinary solutions that are inherently multi-objective. That is, solutions able to address more than one problem simultaneously while addressing the entire resource based on local circumstances. The Integrated Watershed Management Program proposes a framework for fostering interdisciplinary on-ground implementation activities. Interdisciplinary takes on a meaning of multiple dimensions and scales. In one instance vertical dimensions: encompassing both surface water and ground water quality at the watershed scale. In the other instance, the lateral dimension considering the varied land uses and land covers associated with agriculture, silviculture, mining, and hydrologic/habitat modification activities, as well as those associated with urbanization (e.g., land development, transportation, recreation, etc.). These land uses and activities give rise to varying degrees of non-point source pollution or polluted runoff, which is the major contributor to impaired waters (National Research Council, 1999).

Over the past two decades, there have been numerous applications of integrated watershed management worldwide. For example, integrated watershed management approaches have been recently used for combating drought in the Jhabua watershed in India (Singh et al., 2002), assessing and managing water resources in the upper Chao Phraya in Thailand (Padma et al., 2001), assessing and managing agricultural phosphorus pollution on the Chesapeake Bay (Sharpley, 2000), tackling the problem of land degradation in Australia (Ewing, 1999), and managing the Truckee River in Nevada (Cobourn, 1999). Also, in the United States, the USEPA has been quite instrumental in promoting the integrated watershed approach to management (National Research Council, 1999).

The lessons learned from these and other initiatives indicate that in order to succeed, integrated watershed management must be participatory, adaptive and experimental, integrating all the relevant scientific knowledge/data and user-supplied information regarding the social, economic and environmental processes affecting natural resources at the watershed level (Steiguer et al., 2003). This is due to poor integration and coordination, which is either fostered or hindered by a complex set of environmental and socio-economic and institutional factors at various spatial levels such as "(1) legislation and regulations, (2) policies and guidelines, (3) administrative structures, (4) economic and financial arrangements, (5) political structures and processes, (6) historical and traditional customs and values and (7) key participants or actors" (Mitchell, 1990).

## 3. Organizational approaches in watershed management

With the increase in population water has became a key resources. The result of the development efforts of the countries, demand on the water has been become on maximum level. This situation thread clear water resources and watersheds areas were under the pressure of human activities. So that, many of the international organizations have considered on this problem. In addition to this, they have produced many protection projects to solve water issues. In this study, we compile and evaluate the state of the art, with a special focus on material, which is produced by international organizations such as the World Bank, IFAD, FAO, IWMI.

### 3.1. World bank

Over the past seven years since the World Bank's Water Resource Strategy was created, the Bank's water lending commitments have increased significantly, the quality of the water portfolio was turned around, and the outcome project rating now even outperforms the Bank average. The 2010 mid-cycle implementation progress report, "Water for All in a Changing Climate", and "The Sustainable Infrastructure Action Plan" continue to guide the Bank's strategy for managing water resources. The World Bank increasingly works with partners from multilateral and bilateral agencies, but also agencies within civil society and the private sector at the global, regional, and country levels. It's partners are Global Water Partnership (GWP), International Commission on Irrigation and Drainage (ICID), International Water Association (IWA), UN-WATER, Water Supply and Sanitation Collaborative Council (WSSCC), World Water Council (WWC).

#### *3.1.1. Watershed management approach before the 2000*

The watershed management approach became prominent in developing countries in the 1970 in programs designed to improve upland natural resource management in order to protect downstream resources and infrastructure, when the problems of watershed degradation first became apparent.

The origins of modern watershed management can be traced to several parallel and independent movements: the restoration of the Alps, the conservation movement in the United States in the 1930s; and the watershed rehabilitation activities of colonial governments in Africa (Dargouth et. al, 2008). National and regional programs were set up to address the damage to downstream infrastructure caused by degradation in the uplands. For instance, Indonesia created a National Watershed Development Program in 1976. From the mid-1970s, Brazil launched soil conservation programs that evolved by the mid-1980s into the Integrated Soil and Water Management Program in Microcatchments. India created the National Watershed Development Program for Rainfed Areas in 1990 (Dargouth et. al, 2008).

The watershed management projects in the 1970s and 1980s consisted on specific on-site and downstream physical outcomes, this works have been done only to protect resources by the engineer approaches. So investments were high cost and not always well justified, and the assets and benefits created often had a limited life (Dargouth et. al, 2008). And ecological dimension has never seen in these works. Because of these approaches, there is no chance to put a sustainable management approach in a holistic way.

First generation of watershed management projects in the 1970s and 1980s were to prevent rapid runoff of water, slow down siltation of reservoirs, and limit the incidence of potentially damaging flash flooding. Targets were fixed in relation to physical outputs rather than economic and natural resource outcomes and a top-down planning approach was generally adopted (Dargouth et. al, 2008). In pratical way local people could not adapted to this planning outputs. So, general result of this top-down planning approach was a total mass on side. Nowadays, local users empty these old infrastructure buildings, which have been built by this plan and authors and scholars try to remediate this areas.

The need to improve the livelihoods of the poor upland population was not completely ignored, but the technical improvements for agricultural production introduced usually focused on costly vegetative and mechanized technologies (Dargouth et. al, 2008). Watershed planning was based on land capability rather than on the capacities and needs of

| | **Main Purpose** | **Applications** | **Results** |
|---|---|---|---|
| 1970s | -To protect on-site and downstream resources and infrastructure of site | -physical measures designed to manage soil and water resources in medium or large river valleys<br>-to stabilize uplands through erosion control infrastructure | High government staff turnover and poor supervision resulted in inconsistent project management and unaccountable implementation arrangements.<br>Projects often ignored crucial inter-sectoral linkages, resulting in lack of collaboration and communication across sectors. |
| 1980s | -Beyond the engineering approaches acceptance of large scale collaboration between national and international organizations | -To protect to soil, water and vegetation resources<br>-To try to decrease of local community poverty<br>-Ecological and institutional sustainability of the resources management<br>-To try watershed management approaches in dry land areas | -the comparative failure of the "engineering-led" approach was clear<br>-lack of collaboration and communication across sectors |
| **1990s** | -To resource, use productivity, livelihood improvements, and poverty reduction objectives in addition to resource conservation. | -To identify and execute interventions within an integrated farming systems approach, including lowland and upland agriculture, pasture, and forest management<br>-To adopt a participatory and demand-driven development approach, which was influenced by emerging theories of "farmer first" | -To led watershed management programs to seek ways to build on existing social structures and institutions and to support planning and implementation by community institutions the promotion of low-cost vegetative techniques for erosion control replaced or complemented the previous "mechanical" techniques that had relied on heavy construction and had proved expensive to build and difficult to maintain |

**Table 1.** Timeline of watershed management practices (Dargouth et. al, 2008; Chambers et .al. 1989)

local people who lived there. People were hired as manual labor, and projects provided subsidies to stakeholders as incentives to participate (Dargouth et. al, 2008). There was little involvement of the communities in planning and implementation, which often resulted in weak commitment to the project. Benefits were expected to trickle down to the local population, although this generally happened only on a limited scale. It is given some information about water-sheet management studies belong to different years in the table 1.

A number of countries as diverse as India, Kenya, and Nigeria have seen environmental rehabilitation carried out almost spontaneously as population pressure increased or environmental degradation, particularly erosion, reached high levels. For example, Tiffen, Mortimore, and Gichuki (1994) explored the relationship between increasing population density, productivity, and environmental degradation through a case study in southeast Kenya. They showed that population increase combined with market opportunities stimulated local investment and innovation in dry land farming and environmental recovery of heavily degraded land (Dargouth et. al, 2008).

### *3.1.2. World bank projects*

There are many water management projects which were held by World Bank on the issue that the Participatory Watershed Management. In the same time they want to support local economies in the same time by the way, they want to protect natural sources. These projects may include financing critical economic infrastructure such as rural footpaths, sewerage, drainage, roads and water supply.

The development objective of the proposed Participatory Watershed Management Project (PWMP) is to improve the productive potential of natural resources and increase incomes of the rural households in selected watersheds in Jammu & Kashmir using socially inclusive, institutionally and environmentally sustainable approaches. A secondary objective is to support policy and institutional development in in Jammu & Kashmir to harmonize watershed development projects and programs across the state in accordance with best practices (Darghouth et. al., 2008).

Most of the key lessons stem from the previous project, although they are hallmarks of other successful watershed development projects in India (Darghouth et. al., 2008):

- Cost-sharing is critical for ensuring ownership and continued operations of project-financed assets. Hand-outs and full subsidies are to be discouraged.
- Transparency of decision-making and resource allocation is important to ensure that all community members are fully aware of project activities and benefits. Several participatory planning tools, such as social mapping and village account displayed in central places, have been used successfully in this respect.
- As a land-based approach, the watershed development project needs to take into account marginal groups (women, landless, nomadic tribes) who may not directly benefit from project interventions unless targeted efforts are made by the project to cater to their unique needs.

- The proposed project should leverage its resources going beyond target watersheds and encouraging state-wise initiatives in capacity-building and policy reforms that will yield wider benefits (Darghouth et. al., 2008).

National policies on watershed management have generally been driven by program experience rather than vice versa.

Initially watershed management programs were adopted in the 1970s and 1980s by governments as pragmatic responses to natural resource degradation and the related social and economic costs. These programs developed in an iterative fashion, with early setbacks over approaches dominated by engineering being succeeded by tests of community-based approaches targeting sustainable changes in land use practices. Now, in several countries success in testing community-based approaches has led to adoption of broader policies for community-based watershed management (Darghouth et. al., 2008).

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 (Darghouth et. al., 2008).

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. Policy is now based on a community-driven approach to natural resource management, integrating forestry, soil and water conservation, and crop and livestock production. 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 microwatershed level and the development of watershed-based forest resource management plans (Darghouth et. al. 2008).

There are some projects which has been held by World Bank in Turkey where the two continent are joined. One example of this projects is Eastern Anatolia Watershed Project. This subproject would seek to identify and establish in-situ conservation areas in Turkey, for the protection of genetic resources and wild relatives of important crops and forest tree species that originated in Turkey. It will provide for sustainable in-situ conservation of genetic resources in cereals, horticultural crops, medicinal plants, forest trees, and pasture grasses and legumes through an integrated ecosystem approach. It will also contribute to the broader objective of conserving sustainable farming and forest systems that is a key element of the Watershed Rehabilitation project. The project has been developed the institutional capacity in Turkey for preparing and implementing a national strategy for in-situ conservation which could include landraces in a second phase Project. The aim was to test and develop a new approach to conservation of genetic diversity which has not been tried on a large scale anywhere in the world (Anonymous, 2012c).

Dams influence both water quality and the very functionality of rivers, of planetary life cycle processes harming people, culture and nature, collectively. Roughly two-thirds of the world's rivers have suffered harm from the ten thousands of dams that have been built over the past century. Many of the world's great rivers such as the Indus, the Colorado, and the Yellow Rivers, no longer reach the ocean, turning once-productive deltas into biological deserts. More than tropical rainforests, marine environments, or coastal wetlands, freshwater ecosystems are experiencing the greatest loss of biodiversity, in large measure due to dams. Over the past 40 years, freshwater ecosystems have lost 50% of their populations and over a third of remaining freshwater fish species are threatened with extinction. Presently, the great river basins of the world are experiencing a new wave of damming: The Amazon, the Mesopotamia, the Congo, the Mekong are each superlative in their contributions to planetary cycles, biodiversity and cultural evolution of human civilization. Each of these basins is threatened with audacious and narrow-sighted schemes that will irreversibly disconnect rivers and cost the planet billions in lost ecosystem services. The main reason underpinning this new wave is that dams are misinterpreted as "renewable energy"and promoted as solution to climate change. Yet, as proven different parts of the world, such as Amazonia and Mesopotamia, dams do not generate renewable energy, but irreversible natural and cultural destruction. Also scientific studies indicate that dams and reservoirs are globally significant sources of the greenhouse gases carbon dioxide and, in particular, methane (Anonymous, 2012d).

Dams have significant adverse effects on heritage through the loss of local cultural and archaeological sites and resources. For instance, Ilisu Dam will destroy more than 300 archaeological sites, including the 11,000 year-old historic town of Hasankeyf that is the only place in the world that meets nine out of 10 criteria for UNESCO World Heritage Site status (Anonymous, 2012d).

Dams also cause loss or damage of cultural heritage through land reclamation and irrigation projects and the construction of power lines, roads, railways and workers towns. In most cases, no measures have been taken to minimize or mitigate the loss of cultural and archaeological resources (Anonymous, 2012d).


**Figure 1.** Hasankeyf, a demonstration against the construction of the Ilisu Dam, held by Turkish Nature Organization and general view of the area (Anonymous, 2012e and Anonymous, 2012f).

### 3.2. International Fund for Agricultural Development (IFAD)

International Fund for Agricultural Development (IFAD), a specialized agency of the United Nations, was established as an international financial institution in 1977 as one of the major outcomes of the 1974 World Food Conference. IFAD is dedicated to eradicating rural poverty in developing countries (Anonymous, 2012g).

In recent decades, IFAD has supported changes in land and water governance as a way to improve rural poor people's access to these natural resources, and to ensure poverty reduction, increased food security and better livelihoods. This involves working through community-based and civil society organizations and NGOs to better identify the changes that are needed, and with national and local governments to change policies and legislation. The aim is to empower rural poor people to participate in managing the common property resources on which they depend.

Paid environmental or watershed services are increasingly recognized as a potential source of additional income for poor rural people. IFAD's Environmental and Social Assessment Procedures, which include operational statements, for example on irrigation, range resources, inland fisheries and wetlands, regulate exploitation of water resources and the environment.

The State of the World's Land and Water Resources for Food and Agriculture (SOLAW) analyses a variety of options for overcoming constraints and improving resource management in these areas of heightened risk. In each location, a mix of changes in institutional and policy measures will have to be combined with greater access to technologies for better management of land and water resources. Increased investments; access to novel financing mechanisms; and international cooperation and development assistance will also help overcome these constraints (Anonymous, 2012g).

This first issue of SOLAW, which complements other "State of the world" reports published regularly by FAO, is intended to inform public debate and policy-making at national and international levels. IWMI is one of 15 international research centers supported by the network of 60 governments, private foundations and international and regional organizations collectively known as the Consultative Group on International Agricultural Research (CGIAR). IWMI's Mission is to improve the management of land and water resources for food, livelihoods and the environment. IWMI targets water and land management challenges faced by poor communities in the developing world/or in developing countries and through this contributes towards the achievement of the UN Millennium Development Goals (MDGs) of reducing poverty, hunger and maintaining a sustainable environment. These are also the goals of the CGIAR (Anonymous, 2012g).

In most developing countries, agriculture accounts for more than 80 per cent of water use. An increased focus on this sector is needed to address the water crisis. For poor smallholder farmers, water and land cannot be treated as separate issues. Government and development actions targeting only land or only water governance changes are unlikely to achieve sustainable impact. For poor farmers, secure land access can lead to secure water access, and the reverse is also true. This in turn leads to access to credit and investment in their farms, which can improve their livelihoods, and improve agricultural water use efficiency (Anonymous, 2012g).

At local level, land and water governance structures already exist in some form, but these are not systematically recognized at higher institutional levels. If reforms are to improve the livelihoods of rural poor people, their voices and concerns need to be heard and acknowledged as part of the reform process.

Indigenous knowledge and practices need to be recognized as a strong basis for building lasting change in land and water governance (Anonymous, 2012g).

The role of women in land and water management and use must be recognized as part of the reform process.

The capacity of individuals, communities and NGOs must be developed so they can take on the responsibilities associated with reforms. Building trust in communities and among partners is an essential part of capacity development, so that they can act collectively for mutual benefit. Sufficient time must be allowed for enlisting broad support for reform. NGOs can be a useful vehicle to support the reform process, which does not always fit with time and budget constraints of development projects. External support is important. Financial support, combined with policy dialogue, can be a catalyst for NGOs, communities and governments to pursue change. International agencies also provide small communities and local and national organizations with a valuable sense of international recognition, credit and encouragement (Anonymous, 2012g).

Documenting land and water governance experiences in a country promotes better understanding of stakeholders' and IFAD partners' views. This creates opportunities for effective pro-poor advocacy and policy dialogue at all levels aimed at improved access to productive natural resources and technology (Anonymous, 2012g).

### 3.3. Food And Agriculture Organization of The United Nations (FAO)

As a knowledge organization, FAO creates and shares critical information about food, agriculture and natural resources in the form of global public goods. However, this is not a one-way flow. FAO plays a connector role, through identifying and working with different partners with established expertise, and facilitating a dialogue between those who have the knowledge and those who need it. By turning knowledge into action, FAO links the field to national, regional and global initiatives in a mutually reinforcing cycle (Anonymous, 2012h).

In assessing the anticipated impacts of climate change on agriculture and agricultural water management, it is clear that water availability (from rainfall, watercourses and aquifers) will be a critical factor. Substantial adaptation will be needed to ensure adequate supply and efficient utilization of what will, in many instances, be a declining resource (Anonymous, 2012h). By the definitions of the FAO; the world's food production depends on the availability of water, a precious but finite resource and nearly half of the world's population is affected in various ways by mountain ecology and the degradation of watershed areas.

## 3.4. International Water Management Institute (IWMI)

IWMI is one of 15 international research centers supported by the network of 60 governments, private foundations and international and regional organizations collectively known as the Consultative Group on International Agricultural Research (CGIAR). It is a non-profit organization with a staff of 350 and offices in over 10 countries across Asia and Africa and Headquarters in Colombo, Sri Lanka (Anonymous, 2012ı).

IWMI's Mission is to improve the management of land and water resources for food, livelihoods and the environment. IWMI's Vision, reflected in the Strategic Plan is water for a food-secure world. IWMI targets water and land management challenges faced by poor communities in the developing world/or in developing countries and through this contributes towards the achievement of the UN Millennium Development Goals (MDGs) of reducing poverty, hunger and maintaining a sustainable environment. These are also the goals of the CGIAR (Anonymous, 2012ı).

Research is the core activity of IWMI. The research agenda is organized around four priority Themes including Water Availability and Access; Productive Water Use; Water Quality, Health and Environment; and Water and Society. Cross cutting activities in all themes include, assessment of land and water productivity and their relationship to poverty, identification of interventions that improve productivity as well as access to and sustainability of natural resources, assessment of the impacts of interventions on productivity, livelihoods, health and environmental sustainability.

IWMI works through collaborative research with many partners in the North and South and targets policy makers, development agencies, individual farmers and private sector organizations. IWMI's new triple approach to uptake is being implemented (Anonymous, 2012ı). This involves:

1. **Project uptake strategies:** These are targeted strategies built into projects at the beginning. They are focused on the project results and the potential users of the results.
2. **Regional uptake strategies:** These are particularly important to keep the momentum going when projects are completed, and to build linkages across projects to provide synthesized messages.
3. **Macro uptake strategies:** This involves making all information and knowledge available as broadly as possible, making it easily accessible and promoted widely (Anonymous, 2012ı).

IWMI supported to some project about ecosystems for water and food security. The result of water management in agroecological landscapes is remarkable.

### *3.4.1. Water management in agroecological landscapes*

Managing agricultural land to deliver multiple services considerably improves values derived. This is best done at the landscape level, linking ecosystems and managing natural resources such as water and land specifically to enhance ecosystem services, thereby integrating all sources of water in the basin, from rain, in the soil, in aquifers and as surface water. Water is then no longer supplied to crops, trees, livestock, or fish, but to multifunctional agroecosystem linked and managed together at the river basin or landscape level. In this way, synergies can be exploited and productivity can be improved, while obtaining benefit from improved carbon storage, erosion control, water retention, waste treatment, and cultural and recreational values including tourism. Notably, most of these added services do not conflict with agricultural production but in many cases improve both its productivity and sustainability.

The recommendations are based on the findings on the various types of ecosystems and integrated ways to enhance water management for food security. In addition, principles of sustainable water management for agriculture in ecoagriculture have been incorporated (Molden et. al. 2007). As a result, the specific recommendations concerning water are only part of the larger message on how to manage natural resources sustainably and make the transition from production systems to multipurpose agroecosystems.

These guiding principles have been combined from various sources and would increase ecosystem services and sustainability while using the same resources, hence be more productive (Swift et al., 2004; Molden et al., 2007; Van der Zijpp et al., 2007; Bossio and Geheb 2008; Hajjar et al., 2008; Swallow and Meinzen-Dick 2009; World Bank 2009; Zomer et al., 2009; Garrity et al., 2010; McCartney and Smakhtin 2010):

Promote diversity within the production systems: Optimizing the diversity of the above and below ground biotic components within the production system (crop biodiversity, animal diversity, soil biodiversity, and pollinators) can increase the adaptive capacity of the cropping system to buffer against fluctuations in water availability, temperatures, pests and diseases, thereby enhancing the resilience of rural livelihoods. Synergies with livestock and aquaculture can be explored to increase resource recovery and productivity, for instance in crop livestock systems, rice-fish culture, tree-crop systems, aquaculture in reservoirs, forest-pastures, or wastewater-fed aquaculture. Integration of trees can help fix nitrogen, tighten nutrient, water, and carbon cycles, and produce additional goods, such as year-round availability of fodder and biomass for use as organic fertilizer and fuel.

Promote diversity in landscapes: Landscapes with high levels of biodiversity are more resilient and better able to mitigate environmental impacts. Large mono-cropped areas can be developed into landscapes with higher levels of biodiversity by identifying and linking natural habitat patches, including aquatic ecosystems. Habitat integrity and connectivity can be maintained by incorporating hedgerows, multipurpose trees, and corridors of natural vegetation interconnecting parcels of agricultural land and natural ecosystems (such as wetlands and forests – these may need to be specifically developed where they are too far away). In large irrigated areas, canals and roads can be lined with perennial vegetation such as trees, thereby also serving as important passages and habitats for animals. Canals and other waterways can connect aquatic ecosystems and thereby maintain the connectivity of migratory routes, providing the variety in habitats required for subsequent life cycle stages such as spawning. Landscape-scale planning of strategic tree cover interventions can reduce flow accumulation by providing sites for water infiltration and penetration. By incorporating both fodder production and grazing land, livestock can be managed at the landscape level too, thereby enabling animals to reach otherwise inaccessible feed sources and avoiding overgrazing and trampling of vulnerable areas.

## 4. Watershed management studies in developing country

For several decades, Integrated Watershed Management has been suggested and tried in several countries in the world, as an effective way to address complex water resource challenges. However its implementation has not been successful in most cases, due to various barriers. In Kenya, this approach is new and requires appropriate strategies to overcome these barriers and stimulate effective integrated watershed management. To design suitable and effective strategies, there is need to understand institutional features at various spatial levels, which promote or hinder integration and coordination. Wamalma's paper therefore explores the prospects and barriers of integrated watershed management of Mara, by examining the existing complex set of biophysical and socio-economic conditions, stakeholders attitudes and perceptions, arrangements for participation of stakeholders, available institutional structures and financial plans, and recent policy reforms in water and forestry sectors. Empirical information was gathered from official documents, direct observations, semi-structured interviews with managers, administrators, politicians and households of Mara watershed. Results indicates that, integrated watershed management of Mara is likely to be fostered by the critical biophysical and socioeconomic conditions, suitable institutional structures that are being established, water and forestry reforms, recognition of stakeholder participation and enhanced education of stakeholders, and leverage of resources from NGOs. However this efforts are likely to be hampered by disparity of views and perspectives, egoistic tendencies of influential leaders, inadequate financial plans, lack of effective coordination mechanisms, ineffective multi-stakeholder process, unwillingness of the local community and the politicians if there interests are not addressed, and lack of legitimacy for the institutional structures that are being created. This study therefore suggests adoption of multi-stakeholder forums for building understanding and bridging the disparity of views, the need to address the legitimate interests of the local community and politicians, and enhanced level of understanding among stakeholders on the interactions and interdependencies among the variables of the ecosystem. Finally the study recommends the need for a more effective coordination arrangement such as elevation of the CAAC (Catchment Area Advisory Committee) to the level of a coordinating agency instead of relying on a single government agency like WRMA (Water Resources Management Authority) as provided for by the water act 2002 at the catchment level. In conclusion as much as the new water sector reforms provide legitimacy, impetus and a framework for integrated watershed management in Mara and other water catchments in Kenya, implementation may still remain a challenge if barriers are not identified and addressed.

Liu et al.'s study highlights two highly degraded watersheds in the semi-arid Amhara region of Ethiopia where integrated water resource management activities were carried out to decrease dependence on food aid through improved management of 'green' water. Whiletop-down approaches require precise and centrally available knowledge to deal with the uncertainty in engineering design of watershed management projects, bottom-up approaches can succeed without such information by making extensive use of stakeholder knowledge. This approach works best in conjunction with the development of leadership confidence within local communities. These communities typically face a number of problems, most notably poverty, that prevent them from fully investing in the protection of their natural resources, so an integrated management system is needed to suitably address the interrelated problems. Many different implementing agencies were brought together in the two study watersheds to address water scarcity, crop production, and soil erosion, but the corner stone was enabling local potential through the creation and strengthening of community watershed management organizations. Leadership training and the reinforcement of stakeholder feedback as a fundamental activity led to increased ownership and willingness to take on new responsibilities. A series of small short term successes ranging from micro-enterprise cooperatives to gully rehabilitation have resulted in the pilot communities becoming confident of their own capabilities and proud to share their successes and knowledge with other communities struggling with natural resource degradation (Liu et al., 2008).

Specifically it has learned that (1) communities have high interest in development initiatives, including sustaining natural resources; (2) only when people make real contributions of their own resources will they strive to ensure the implementation of the planned activities; (3) emphasis must be given to effective organization of communities rather than only focusing on technology development; (4) including non-technical leaders in the information loop provides great benefits at the community level. Introduced ideas, such as the fair representation of women and poor in the management process, women's micro-enterprise groups, and closing off areas to livestock, faced strong cultural opposition at the beginning but have proven very successful thanks to trial tests and continue collaboration efforts by farmers, non-technical leaders, and project personnel. It has also found that communities most at risk were also the most open to new ideas (Liu et al., 2008).

Partnerships and co-operative environmental management are increasing world wide as is the call for scientific input in the public process of ecosystem management. In Hawaii, private land owners, non-governmental organizations, and state and federal agencies have formed watershed partnerships to conserve and better manage upland forested watersheds. In this paper, findings of an international workshop convened in Hawaii to explore the strength of approaches used to assess take holder values of environmental resources and foster consensus in the public process of ecosystem management are presented. Authors draw upon field experience in projects throughout Hawaii, Southeast Asia, Africa and the US main land to derive a set of lessons learned that can be applied to Hawaiian and other watershed partnerships in an effort to promote consensus and sustainable ecosystem management. Interdisciplinary science-based models can serve as effective tools to identify areas of potential consensus in the process of ecosystem management. Effective integration of scientific input in co-operative ecosystem management depends on the role of science, the stakeholders and decision-makers involved, and the common language utilized to compare tradeoffs. Trust is essential to consensus building and the integration of scientific input must be transparent and inclusive of public feedback. Consideration of all relevant stakeholders and the actual benefits and costs of management activities to each stakeholder is essential. Perceptions and intuitive responses of people can be as influential as analytical processes in decision-making and must be addressed. Deliberative, dynamic and iterative decision-making processes all influence the level of stakeholder achievement of consensus. In Hawaii, application of lessons learned can promote more informed and democratic decision processes, quality scientific analysis that is relevant, and legitimacy and public acceptance of ecosystem management (Gutrich et. al. 2005).

Maintaining base-flows in the Pocono Creek is a particular concern. Knowing that the demand for water increases as competition for existing water resources grows with a growing number of users, concerns about sustaining the exceptional water quality and supply for future generations were raised throughout the 2003 Pocono Creek Pilot Project for Goal-based Watershed Planning (Pilot), which was funded by a PA Growing Greener grant. Local resource managers and citizens emphasized this issue during both the Pilot's goal setting (2000) and project evaluation stages (2003). The Environmental Protection Agency's Region 3 Office (EPA-3) organized and funded the current project, known as the Framework for Sustainable Watershed Management (Combe et. al. 2009).

The purpose of the Framework is to introduce a program that balances growth with natural resource protection, so that future generations can enjoy the highly valued natural resources of the region, while enjoying economic prosperity. This program is accomplished in three stages; technical, planning and watershed community outreach. The technical stage identifies the impacts of rapid growth on a watershed's water resources. The planning stage develops management strategies that balance regional growth needs with natural resource protection. The planning and watershed community outreach effort introduces an innovative approach to protecting the region's water resources through a community-wide public art event that receives extensive media coverage, has high visibility and generates enthusiastic community participation (Combe et. al. 2009).

The micro-watershed has proved a flexible and practical unit for project implementation and has reduced costs. However, the definition of a micro-watershed needs to be adapted to the social, administrative, and physical context. Best practice is that choice of scale should be driven by a participatory analysis of problems throughout the watershed, preferably within a broader watershed planning framework, as was done in the Loess II Project in China. In 1994 the World Bank funded one of the most successful conservation projects in the world, which improved the local environment, but also boosted the livelihoods of more than 1 million farmers. The number of people living in poverty in the region dropped from 59 percent in 1993 to 27 percent in 2001 and almost 3,000 square kilometers of eroded land was terraced (World Bank, 2003).

The restoration project worked closely with local farmers to build terraces, plant shrubs and trees, install irrigation and sediment control dams, and provide training and education on erosion control.

This watershed restoration project is now being replicated across China, with continued success (World Bank, 2003).

Based on this, programs can be clear from the beginning about the proposed scale of interventions and the socioeconomic, environmental, and technical criteria for defining the micro-catchment and for selecting which micro-catchments to target. The micro-watershed approach also raises some difficulties when it comes to scaling up. Working at the micro-watershed scale does not necessarily aggregate or capture upstream-downstream interactions. A patchwork of upstream interventions would only have a significant impact downstream if prioritized and planned within the larger watershed context and with understanding of the spatial and hydrological links between the perceived externalities and their causal factors (for example, land and water use). The lesson is that integration of watershed management activities beyond the micro-watershed requires higher level technical planning. In best-practice approaches, planning includes an institutional mechanism where stakeholders have a voice and are able to agree on measures from the micro-watershed scale upwards that can achieve both local and larger-scale objectives. The approach also needs to deal with institutional challenges of interagency collaboration and local-regional–level coordination.

Groetschel's (2000) study has investigated the problem situation in selected villages in Kachchh and Dahod district and looked into the institutional framework of watershed development in Gujarat. Field surveys for the target area analysis were carried out in six villages. In the five priority districts for watershed development activities, 15 NGOs and a number of Government institutions were met and assessed. The study is part of the planning process for the Indo-German Watershed Development Program (IGWDP) in Gujarat. It is geared towards providing a qualitative description of important issues for a region specific watershed development approach and gives recommendations for possible adaptations of the watershed development approach. In answer to the problem of natural resource degradation, more than 1200 watershed development projects have been implemented under different programs by the Rural Development Department in Gujarat since 1995. More than 70 percent of these are operated by NGOs. All government funded watershed development projects in Gujarat follow common guidelines, which determine implementation strategies, program content and components, principles of project management, capacity building, financial aspects and monitoring and evaluation. Major aspects of the approach include sustainability, participation, empowerment and decentralization.

In general, the spirit of the common guidelines must be considered to be appropriate. However, as nation wide guidelines, they lack considerations of regional characteristics and problems. More flexibility would be required in many aspects to ensure appropriate handling of local problems. As an integrated, but, basically land based approach, watershed development needs careful consideration of equity concerns. Soil and water conservation measures alone might otherwise further benefit the rich instead of fostering social and economic cohesion. Implementation problems also arise from cooperation difficulties among different GOs and NGOs. The treatment of forest lands and common property resources, as required in most cases when following the ridge to valley approach, faces many difficulties. For the last years, the emerging Joint Forest Management Program (JFM) has been trying to mitigate some of those problems. Meanwhile it is the largest program of the Forestry Department. In addition to JFM, there are other government programs, which are supplementary to and supportive of watershed development efforts. The status of NGOs in Gujarat is very strong. Many of them have been involved in watershed development related activities for a number of years already. They actively participate in policy dialogues with the Government and are a driving force in pursuing adaptation of the watershed development approach. Many of the NGOs have developed special implementation strategies, often depending on their specific field of interest or the background of their organization and staff.

Other NGOs are implementing regionally adapted solutions based, for example, on the problem of salinity in coastal areas. In 1999, the National Bank for Agriculture and Rural Development (NABARD) joined the watershed development efforts by establishing its Watershed Development Fund. The fund aims at further strengthening participatory watershed development initiatives. The selection criteria for watersheds are a significant proportion of Scheduled Castes/Scheduled Tribes (SC/ST) population, high extent of rainfed farming and a high potential for watershed development. The regional watershed management cell of NABARD, which took up work in August 1999, is planning to undertake 19 projects at the first stage. Number and staff composition will have to widen, when the program expands.

Successful project implementation demands a range of skills and attitudes at village, NGO and program management level, which are not always or not sufficiently developed. Capacity building, therefore, plays a central role. Requirements at village level include raising awareness for environmental problems and resource management. Additional training will be required in order to make best sustainable use of conserved resources. Many NGOs in Gujarat have been successfully involved in watershed development projects. They have gained ample experience with this approach. What is still needed in some cases is to balance any existing bias in their work, which in many cases is either on the social or on the technical side. However, capacity building for the proposed IGWDP in these respects will probably not require the establishment of a separate institution. There are well established networks, which take care also of capacity building requirements. Requirements at the management level will mainly comprise comprehensive supervisory and monitoring functions.

An important goal of watershed management is to ensure the sustainable development of water resources. However, since integrated watershed management is much easier said than done, this approach is going to illustrate a real watershed, the Big Lost River watershed located in south-eastern Idaho, that has suffered from practical problems and examine this watershed in terms of sustainability just before and after the implementation of this approach. The Big Lost River watershed is about 3730 $km^2$ and drains into the Big Lost River and its tributaries, which in turn drain to the Eastern Snake River Plain. The Big Lost River is one of the largest tributaries to the Eastern Snake River Plain. Although the majority of the land in the Big Lost watershed are forest and grass land, agriculture, animal raising, and residential development make significant contributions to the water quality and quantity problems.

To achieve the goals of both the stakeholders and the management decision-makers under sustainability conditions, it is necessary to implement the following steps:

1. The existing characteristics of the Big Lost River watershed should be assessed. This will (a) include determining problems that can hinder the watershed management effort, (b) classifying these problems into groups (scientific, social, or motivational), and (c) determining the priorities in solving these problems.
2. Suitable solutions to solve these problems should then be proposed such as:
   a. developing useful relationships among selected water quality parameters to make evaluation of the water quality situations easier by using a small number of parameters,
   b. improving integrated management of surface and ground waters by estimating uncertainty in the water budgets,
   c. exploring interactive methods for effective public participation, and
   d. determining the impact of water quality deterioration and the increase in water demand on water-use physical sustainability.
3. These solutions should be evaluated by examining the sustainability. This approach seeks to introduce a pertinent watershed management framework that can be used to bring Together major stakeholders in a watershed in an-unified effort to protect and improve the quality and quantity of their watershed. The approach can be shared among decision-makers and stakeholders and the results can be used to evaluate and achieve water quality improvements and water quantity conservation. The study tackles watershed problems using a robust technique based on watershed management feasibilities. While this technique has scientific tools to solve watershed problems, it also uses sustainability and public participation as great issues of socio-economic values. The examination of water quality effects, especially erosion of lands and increasing sedimentation as well as increases in water demand due to population or land use changes, on the physical sustainability of water use in a watershed will be a significant benefit and can be applied for other watersheds. The proposed actions related to improving water quality and conserving water quantity, will lead to successful watershed management and encourage stakeholders to participate in the decision-making processes (Said et. al. 2006).

## 5. Current situation of watershed management in Turkey

### 5.1. Watershed in Turkey

Turkey has been separated into 25 different hydrologic watershed area (Table 2. Figure 2) and annual flow of these areas are nearly 186 billion cubic meters. One of third of these flow has been calculated in the Tigris watershed area which is situated in the eastern part of the

Turkey. In the spatial terms volume of these watershed has been followed by Kizilirmak and Sakarya watershed and in the term of the rain regime these watershed has been followed by the East Blacksea, East Mediterranean and Antalya Regions (Anonymous, 2013).

Social and demographic conditions and resource usage of the watershed has been changed by the aspect of the vertical and horizontal conditions of the area and it has been showed differences by the local conditions. Upper parts of the watershed and in the east regions of the country, the general population levels are commonly low levels. Rural poverty and necessities to use of natural resources to sustain life is more common in the upper part of the watershed and eastern part of the country rather than the western parts. Upper parts of the watershed main economic activities are livestock, small agricultural production and forestry. In the contrast of these situation downstream areas are widely used for agricultural products (Anonymous, 2013).

The amount of the total water resource is 112 billion cubic meter and %36 of these water is proper for use and 32 billion cubic meters are used for irrigation, 7 billion cubic meters are used for drinking water and 5 billion cubic meters are used for industrial proposes (Anonymous, 2013).

In the last decades, with the participation of the non-governmental organizations and universities, there is a great awareness in the public about the sustainable use of natural resources and its benefits (Such as soil protection, water volume and quality, carbon emission, protection of the biological diversity etc.). With the parallel these situation, there is an increase of the projects about rehabilitation works, soil protection barriers and action plans to protect natural biological diversity (Anonymous, 2013).

| Watershed name | Rainfall area | | Avarage annual flow | | Avarage annual productivity |
|---|---|---|---|---|---|
| | ($km^2$) | % | ($km^3$) | (%) | ($l/s/km^2$) |
| (01) Meric-Ergene Watershed | 14,560 | 1.9 | 1.33 | 0.7 | 2.9 |
| (02) Marmara Watershed | 24,100 | 3.1 | 8.33 | 4.5 | 11.0 |
| (03) Susurluk Watershed | 22,399 | 2.9 | 5.43 | 2.9 | 7.2 |
| (04) North Aegean Watershed | 10,003 | 1.3 | 2.09 | 1.1 | 7.4 |
| (05) Gediz Watershed | 18,000 | 2.3 | 1.95 | 1.1 | 3.6 |
| (06) Kucuk Menderes Watershed | 6,907 | 0.9 | 1.19 | 0.6 | 5.3 |
| (07) Buyuk Menderes Watershed | 24,976 | 3.2 | 3.03 | 1.6 | 3.9 |
| (08) West Mediterranean Watershed | 20,953 | 2.7 | 8.93 | 4.8 | 12.4 |
| (09) Antalya Watershed | 19,577 | 2.5 | 11.06 | 5.9 | 24.2 |
| (10) Burdur Lake Watershed | 6,374 | 0.8 | 0.50 | 0.3 | 1.8 |
| (11) Akarcay Watershed | 7,605 | 1.0 | 0.49 | 0.3 | 1.9 |

| Watershed name | Rainfall area | | Avarage annual flow | | Avarage annual productivity |
|---|---|---|---|---|---|
| | (km²) | % | (km³) | (%) | (l/s/km²) |
| (12) Sakarya Watershed | 58,160 | 7.5 | 6.40 | 3.4 | 3.6 |
| (13) West Blacksea Watershed | 29,598 | 3.8 | 9.93 | 5.3 | 10.6 |
| (14) Yesilırmak Watershed | 36,114 | 4.6 | 5.80 | 3.1 | 5.1 |
| (15) Kizılırmak Watershed | 78,180 | 10.0 | 6.48 | 3.5 | 2.6 |
| (16) Konya Watershed | 53,850 | 6.9 | 4.52 | 2.4 | 2.5 |
| (17) East Mediterranean Watershed | 22,048 | 2.8 | 11.07 | 6.0 | 15.6 |
| (18) Seyhan Watershed | 20,450 | 2.6 | 8.01 | 4.3 | 12.3 |
| (19) Asi Watershed | 7,796 | 1.0 | 1.17 | 0.6 | 3.4 |
| (20) Ceyhan Watershed | 21,982 | 2.8 | 7.18 | 3.9 | 10.7 |
| (21) Fırat-Dicle Watershed | 184,918 | 23.7 | 52.94 | 28.5 | 8.3 |
| (22) East Blacksea Watershed | 24,077 | 3.1 | 14.90 | 8.0 | 19.5 |
| (23) Coruh Watershed | 19,872 | 2.6 | 6.30 | 3.4 | 10.1 |
| (24) Aras Watershed | 27,548 | 3.5 | 4.63 | 2.5 | 5.3 |
| (25) Van Lake Watershed | 19,405 | 2.5 | 2.39 | 1.3 | 5.0 |
| **Total** | **779,452** | **100.0** | **186.05** | **100.0** | |

**Table 2.** The Watershed of Turkey (Anonymous, 2013)


**Figure 2.** Watershed areas in Turkey (Anonymous, 2013)

## 5.2. Stakeholders about watershed management in Turkey

Watershed management practices in Turkey were held mainly by the governmental organizations such as ministry departments and governmental agencies. Briefly these agencies can be classified by the ministries occupation. These are include (Anonymous, 2013);

**Agencies in the Ministry of Forestry and Hydraulic Works:** General Directorate of Combating Desertification and Erosion, General Directorate Of Forestry, General Directorate for State Hydraulic Works, General Directorate of Water Management, Directorate of Nature Conservation and National Parks, Directorate of Meteorological Services, Presidency of Strategy Development, Turkish Institute of Water, Presidency of Information (Anonymous, 2013).

**Agencies in the Ministry of Food, Agriculture and Livestock:** General Directorate of Agricultural Improvement, General Directorate of Vegetative Production, General Directorate of Agricultural Researches and Politics, General Directorate of Fishery and Water productions, Department of GIS (Anonymous, 2013).

**Agencies in the Ministry of Environment and Urban Planning:** General Directorate of Spatial Planning, General Directorate of Control about Environmental Impact Assessment, General Directorate of Environment Management, General Directorate of Protection about Natural Heritage, General Directorate of City Bank, General Directorate of Infrastructural Works (Anonymous, 2013).

**Agencies in the Ministry of Energy and Natural Resources:** General Directorate of Quarry Companies (Anonymous, 2013).

Ministry of Culture and Tourism, Ministry of National Education, Ministry of Health.

**Agencies in Prime Ministry:** Under secretariat of Treasury, Disaster and Emergency Management Presidency

Agencies in the Ministry of Interior: General Directorate of Local Administration

Local Administrations; governorship (Anonymous, 2013).

**Other Civil Stakeholders:**

Non-governmental Organizations: (Organizations, groups, activists about the issues like Soil and Water Resources, Biological Diversity and Rural Development)

Profession Chambers

Watershed Groups

Rural Societies who lives in Watershed Region

Science and Education Organizations (Universities, The Scientific and Technological Research Council of Turkey, Research Institutes)

Stakeholders from Private Sector (Anonymous, 2013).

Stakeholders of Watersheds have different views and importance about economic, ecological, social and cultural by the results product (energy management, clear water resources, irrigation water, water for industrial needs, income and productivity, conservation of the biological diversity, protection of the air cleanness, recreation needs, natural landscape, eco-tourism, game sports, protection of the local cultural motivations of the watershed, national income, surplus to liberal economy) (Anonymous, 2013).

## 5.3. SWOT analysis of the watershed management

There is a strong need to swot analysis for figuring out about the future goals and aims of the watershed management (Figure 3).

| SWOT ANALYSIS | |
|---|---|
| **Strengths** | **Weaknesses** |
| Organizations have gained their experience about the watershed management and therefore they can attempt to management in a more holistic way | Inadequacies in the terms of the watershed management politics and strategies in addition to these problems about coordination between sectorial investments |
| Increase in the watershed protection and monitoring action plan and river region management plans | Coordination, legality, policy problems between governmental agencies |
| Increase about governmental investments for the watershed organizations | Inadequacies in the term of the participation of the non-governmental organizations and local people |
| Increase in the terms of the soil protection and watershed rehabilitation | Problems about the sharing information between agencies about development plans |
| Increase in the knowledge share between governmental and non-governmental organizations | Inadequacies conditions about monitoring system which is caused by the lack of the modern investigation systems |
| Increase in the term of the protection area volume | Lack of national watershed monitoring data set |
| Biological diversity monitoring department has been established a data matrix to inventory of the biological resources | Inadequacies to set priorities about watershed projects and actions |
| | Deficiencies to set rules of the watershed plans for coordinating management actions |
| | Deficiencies in the lack about to monitoring of ecological and socio-cultural data's |
| | Deficiencies in the calculation of the cost benefit analysis about the stakeholder who effected both positive and negative |
| | Lack of the sharing information and dialog between researches and applications |
| | Lack of the stuff who should work for management agencies |

| SWOT ANALYSIS | |
|---|---|
| **Opportunities** | **Threats** |
| Decrease of pressure on the upper watershed by stakeholders because of the mitigation | The deterioration and extinction process on limited natural resources |
| Access to data and possibilities of utilization of technology | The deterioration of population balance among the downstream and upper watershed |
| Diversity and potentials of Watershed that are caused by natural resources and living creature's | Because of increasing of the population, increase of demand and requirement from watershed areas' products and services. |
| Increase of awareness on the society to natural resources and environmental protection | Rural poverty |
| Increase of NGO's effects and contributions | Because of migration to urban, decrease of young population in the term of work force in rural area |
| Increase of political attention and support | Inadequacies of sensitivity and education of the watershed resources value |
| Development of institutional participatory approaches | Problems of ownership and right of usage |
| Increase of job opportunities to local community to work in several remediation processes | Increase of industrial pollution |
| Improvements in legality and policy which was started with the EU adaptation processes | Increase of using chemical pesticides and fertilizers |
| Developments in the watershed management in the world. | Threats on the biological diversity |
| Increase of scientific research capacities. | Inadequacies in the terms of the legal sanction about problematic application processes |
| | Negative effects on watershed which is caused by climate change process |
| | Increase of industry at the watershed areas |
| | Increase of mining at the watershed areas |

**Figure 3.** SWOT Analysis for Watershed Management in Turkey (Anonymous, 2013).

## 6. Discussions and conclusion

All the organizations is interested with poor people and dedicated to eradicating rural poverty in developing countries.

Main problem about this issue is rapid demographic chance in both rural and urban areas in developing countries. Rural areas have been emptied by the migration progress that is caused by unemployment and poverty in rural areas. Beside this situation, huge urban sprawl has been seen on many cities in developing countries. Water demand on the cities that has got huge reservation of the population has been become big problem for clean water resources and sustainability of this resources can not be produced by the managers and governments. However, watershed management should be collaborative. Collaborative watershed partnerships consist with different land use patterns: one in an urban environment, and the other rural. A good practice of healthy and sustainable watershed management is based on a good understanding of these two distinct territories that have different organic and fabric organization schema.

Researchers have paid particular attention to the effect of land use on water quality (Lenat and Crawford, 1994; Hall *et al*., 1994, Wang and Yin, 1997), a water-quality component often is missing in land-use plans and land-use planning is rarely used in water-quality management. This could be because water-quality management and land use planning often are administrated by different agencies that do not coordinate constantly. Both of planning agencies and local authorities are not use feedback datas for developing plans to monitor of extensive land use and water-quality chances. Water-quality management agencies traditionally address existing water-quality problems rather than to prevent to cause a problem in the main sources. Planners and decision-makers should pay proper attention to water-quality issues in evaluating plans and facilitating collaborations. They should pay enough attention to significancy of land and water collaboration (Wang and Yin, 1997),.

Governments and development organizations worldwide are searching for new ideas on how to bring more participation that is public into environmental policy decision processes. Some social and political movements, too, are expanding their participatory outreach and organizing techniques (CIELAP, 2004). Many of the nongovernmental organizations and green activities seek to focus public opinion globally on the importance of water rights (Council of Canadians, 2006). In addition, as mentioned above, the European Water Framework Directive is pushing jurisdictions and cross-jurisdictional water basin committees to implement new participatory processes. Researchers, consultants and activists are generating practices, which can be widely discussed and shared. However, in the end, while many insights can come from hearing what worked and what did not in other places/situations, there is no substitute for locally designed and locally appropriate public participation processes, both within and outside of government (David, 2005).

As the conclusion of the European Water Framework Directive Guidance Document on Public Participation states, ''The preamble of the Water Framework Directive includes a very clear statement: active public involvement is most likely the key to success with regard to achieving the desired water quality objectives.'' In other view, the water users and water polluters need to be turned into part of the solution, not kept outside the considerations as part of the problem. Active involvement is important, however, to take into account that no blueprint solution can be provided. Each River Basin District has to find its own way to handle this, taking into account the prevailing cultural, socio-economic, democratic and administrative traditions. Careful planning, stakeholder analysis is a particular recommendation, but each competent authority has to accept that a dynamic and learning process based on ''trial and error" is the challenge to embark on. Experiences showed that given sufficient time it would pay off in the long run (EC,). According to Perkins (2011), government initiatives in a very positive light and ignores issues such as in what sense water users who are unserved by infrastructure or too poor to pay for water are really ''stakeholders," how the ''payoff" of a public learning process might be measured, and to whom this payoff accrues (Perkins, 2011).

Watershed Watershed management project results which are successful in the term of both theory and application, the role of class and gender, among other differences, as determinants of everyone's standpoint and possibilities for participation must be acknowledged. Liberal individualism is certainly not the only thing going on in any participatory process. The truly radical nature of participation only appears as and when it leads to economic redistribution – not just policy-making within existing structures of distribution. Under capitalism and due particularly to its second, ecological, contradiction ( O'Connor, 1994), the pressing need for local environmental knowledge and the contributions of diverse constituencies (Fischer, 1993; McKinney, 2002) in order to address ecological constraints has arguably loosened the controls which the state has traditionally placed on democracy. The type of policy analysis that is ''antagonistic to authentic democratic participation" (Fischer, 1993) is now giving way in some instances to more democratic policy-generating processes as a means of addressing intractable environmental problems. However, the inherent open questions of gender, ''race," ethnicity and class inequities remain. To address both the ''top-down" and the ''bottom-up" challenges to broadening public involvement in watershed decision processes as cited above, a creative combination of grassroots environmental education and community organizing is needed. Community-based environmental education initiatives, which are relevant and they are interesting for local residents and increase their knowledge of watershed issues (Fischer, 1993).

Watershed affect the daily lives of every one of many countries 's citizens and provide a powerful wall of protection for countries 's economic development. Data are scarce, but subjective understanding is clear: throughout much of the developing world watersheds are vital to the livelihoods of many millions of people.

Today issues about the water management should be appropriate to the nature as Thales had been said "water is not a just a common material besides it is a spiritual basin". Because of them water management should not be just an engineering work besides it should be a social work which should consider on the both social and cultural work too. So that, common problems can be solved easily and outputs of the projects will be more productive. Rivers are not just a natural sources for transportation, fresh water, energy or irrigation, none or the less they are the basic ground for human culture of the nearby areas. All the ancient great civilizations have been settled near the great rivers, and most of the modern civilization have a peace with their rivers. Because of them combining links between nature and society is the most important issue for sustainability.

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