

CHAPTER 3

Watershed management in Afghanistan: Lessons from South Asia

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3.1 Introduction

Land degradation is increasing over years, extending even to the less densely populated mountain regions like Afghanistan, Bhutan, Nepal, etc. The initial perception that anthropogenic factors are responsible for degradation has changed with the availability of more scientific information on geology, steepness, soils, rainfall intensity, etc. These factors coupled with the local land and water management factors are identified as the main reasons for land degradation. Such an awareness has prompted actions promoting soil conservation technologies as well as government policies and programs, viz., forest management, watershed management, and protected area management (for a review see [Tiwari et al., 2008](#)). Of these watershed management is the most widely adopted technology as it can contain water and wind erosion effectively. Watershed technology is also suitable to protect and enhance soil fertility. More importantly, it caught the policy attention in some countries due to its potential to conserve soil and water in the water-constrained (low rainfall and low irrigation potential) regions. For, these regions account for more than 75% of the cropped area in the world and a third of the developing world's population ([World Bank, 2008](#)).

3.1.1 Watershed management

A *Watershed* is a topographically delineated area that is drained by a stream. Watershed development (WSD) is a land-based technology that helps conserve and improve in situ soil moisture, check soil erosion, and improve water resources, especially groundwater. Watershed Management (WSM) deals with adoption of watershed technologies in specific watersheds

(Reddy et al., 2010a). The approach of watershed management ought to be holistic and integrated involving hydrological, biophysical, and socio-economic systems. Often adoption of watershed technologies requires collective or cooperative strategies among individual households and communities as watersheds cover large areas of private and public lands, transcending villages. People's participation, thus, is recognized as a key factor in effective implementation of the program. Thus, WSM is a combination of "science and art"/"technology and philosophy" (Tiwari et al., 2008; Reddy et al., 2010a). Throughout this chapter, the terms WSM and IWSM are used interchangeably.

Approach and purpose of WSM varies across countries of South Asia. It ranges from soil and water conservation (most countries) to rangeland protection (Afghanistan and Pakistan) protecting rivers/reservoirs (irrigation) (Afghanistan, Pakistan, etc.) to protecting reservoirs (hydel plants) (Nepal and Bhutan) to enhancing ecosystem services (Sri Lanka) and to improving land productivity in the water-constrained regions (India). In terms of scale, some of the South Asian countries have shifted to micro (500 ha) watersheds, others continue to treat areas above 5000 ha. India (2009 onwards) also adopted the mega watershed (5000–10,000 ha) approach under the integrated watershed management program (IWMP). Afghanistan, after a long-drawn unrest, is attempting to implement the watershed development program in order to enhance the livelihoods of the local communities.

Afghanistan is an arid to semiarid country receiving erratic rainfall over the years. Rainfall varies from 75 mm in Farah to 1170 mm in south Salang. Southern part of Afghanistan receives the least rainfall (100–300 mm/year) followed by western (200–400 mm) and northern parts. Rainfall occurs mostly in the winter months, particularly in the February–April period. Afghanistan is drought prone with severe droughts occurring once every 10–15 years. Cropped area accounts for only 12% of land area, while 45% of the land area is under range lands, which supports livestock. About 41% of the crop land is irrigated. Livestock contributes substantially to the livelihoods in Afghanistan though the relative importance differs between provinces. Afghanistan has a typical problem of crop season not coinciding with rainy season. As a result, it faces spatial as well as seasonal water scarcity, making water storage necessary for protecting the crops. Both crop lands and range lands are degraded heavily due to destruction of forests, excessive grazing, fuel wood collection, and encroachment of pasture lands for cultivation. Apart from soil erosion and low biomass

production on rangelands, incidence of flash flood has increased (Favre and Kamal, 2004). Watershed development in Afghanistan could potentially transform agriculture.

This chapter aims at providing a basic watershed policy and implementation framework for Afghanistan. This framework would be based on a critical review of experiences of WSM initiatives in different countries of South Asia. The idea is to identify appropriate methods and approaches in terms of technology and institutions that are being adopted in different countries. These methods and approaches need to be tuned to suite the specific conditions in Afghanistan.

3.2 Evolution of WSM in South Asia

Watershed interventions may be considered as 5000 years old (FAO, 2006), though the potential of watershed technology started to be fully exploited in Europe between the 16th and 17th centuries. This coincided with the advent of new cultivation techniques (slow drainage and abundant fertilization), emergence of new crops (maize, potato, etc.) and implements, private farming, and higher yields. Sustaining these yield rates to meet the needs of growing population called for major public investment in irrigation, land reclamation, and watershed management works (FAO, 2006).

In the context of South Asia, WSM evolved in two phases. The first phase was triggered by the construction of big irrigation schemes and hydro-power dams during 1950s and 1960s. Fast sedimentation of reservoirs, increased incidence of flash floods in downstream areas has given rise to WSM planning. This has received further fillip with the environmental concerns coming into fore during the 1970s. The decade of 1970s, however, was occupied with the promotion of green revolution technologies and food security shadowing every other aspect related to agriculture. WSM was back into policy agenda during the early 1980s with the saturation of yield gains from green revolution, which was limited to irrigated regions. As productivity growth in the green revolution areas was showing signs of slowing down (Pingali and Rosegrant, 2001), future growth in agricultural production and food security is likely to depend on improving the productivity in the rain-fed areas. From an economic angle too, there was evidence indicating that marginal returns to investments would be substantially higher in these regions when compared to the irrigated regions where potentials for productivity growth have already been exploited

(Fan and Hazell, 2000). Improving the natural resource base and livelihoods of the communities in the poorly endowed regions has also become a policy priority. In fact, the “agenda 21” stresses that successful watershed management must be based on local stakeholders’ informed participation in natural resource management, economic growth, and social change (FAO, 2006).

In most of the south Asian countries, evolution of WSM had the beginnings during the 1980s. The purpose of WSM varies across south Asia depending on their national priorities (Table 3.1). Some countries (India, Nepal, and Bhutan) have accorded high/medium policy priority for the WSM programs, while in others (Pakistan, Afghanistan), watershed interventions are limited to mountainous terrains, range lands, and forest areas. The difference between India and other countries is the emphasis on crop lands. This differential coverage or focus has a natural division of covering private lands (crop lands) and public or common lands. Nepal also has to deal with treating private and common lands together due to the terrain. This has given rise to the need for people’s participation for better implementation, as number of private parcels of land are to be treated under the watershed. Thus, India and Nepal are among the first to introduce participatory WSM in the region and others adopted it later.

The level of participation and involvement is dependent on the benefits directly accruing to the local communities. Direct benefits to the communities are more in the case of interventions on crop lands, range lands, and forest areas. On the other hand, interventions such as catchment protection, controlling soil erosion and protecting reservoirs, protection of hilly areas, etc. provide indirect benefits to the communities. In order to achieve active involvement of people, Nepal has integrated livelihoods components with watershed interventions. In some cases, the interventions take place far from the communities. For instance, while communities in the upstream areas (where the interventions take place) may get limited benefits, downstream communities benefit more. In such cases, upstream communities have little incentive to participate.

3.2.1 India

The earliest example of soil conservation measures in undivided India is the Bombay Plan during the early decades of 20th century, which introduced systematic adoption of dry farming techniques. These were known as soil conservation methods in drought-prone regions. These methods were adopted on a piecemeal basis, more as relief measures (Shah, 1998). This piecemeal

Table 3.1 Evolution of modern watershed management in South Asia.

Country	Period	Biophysical conditions	Purpose	National priority	Approach
Afghanistan	1980s	Low rainfall and arid; high proportion of range lands; heavy soil and range land degradation	Range land protection and catchments	Low (mostly external)	In the initial stages
Bangladesh	1970s	High rainfall; flood prone	Check soil erosion and forest protection in Hilly regions	Low only hilly regions (mostly internal)	Forest and catchment focus (integrated watershed management)
Bhutan	1980s	High rainfall; degradation in Mountain regions and catchments	Protection of reservoirs (Hydel)	Medium only mountainous (mostly external) areas	Integrated watershed management
India	1970s	Arid and semiarid with varying rainfall; large proportion of rain-fed; heavy soil and water resource degradation	Enhancing the productivity and reducing yield vulnerability in the rain-fed regions	High. Covering crop and forest lands in all terrains of rain-fed regions (mostly internal)	Participatory and integrated watershed management with a focus on enhancing livelihoods in rain-fed regions
Nepal	1970s	High rainfall; degradation of mountain regions	Protection of reservoirs (Hydel) forest protection and livelihoods	Medium to high. Covering mountainous regions (mostly external)	Participatory and integrated watershed management
Pakistan	1980s	Low rainfall; large proportion of range lands; degradation of range lands; mountain regions and catchments	Protection of reservoirs (irrigation); protection of rangelands	Low covering mountainous regions (mostly external)	Participatory and integrated watershed management
Sri Lanka	1980s	High rainfall; degradation of soil and water resources	Protection of reservoirs (irrigation). upstream soil protection and water quality	Low covering upstream areas of the catchment (mostly external)	Participatory watershed management at the basin scale reservoir protection (irrigation)

Source: Based on the studies quoted in the text.

approach had continued till 1980s when the integrated National Watershed Development Programme for Rainfed Agriculture (NWDPR) was launched. Successive Indian Governments have recognized the value for WSM and have often sought to promote it, though approaches and guidelines kept changing. With one of the highest land use intensities in the World, with very little amount of land for grazing, the main focus of WSM has been on croplands.

Since 1991, three guidelines were issued in order to improve the performance of the program. Of these, the 1994 guidelines are landmark in WSM in many respects. These guidelines formalized participation through making the involvement of all sections of the community as a prerequisite. Involvement of NGOs in the implementation was encouraged. These guidelines also set forth systematic implementation modalities at the district level and below (Reddy et al., 2010a,b). While 1994 guidelines remained the basis, in 2006 *haryali* guidelines were brought in giving the village panchayats central role in implementing the program. Cost norms were increased Rs. 4000 (US\$ 100) to Rs. 6000 (US\$ 150) per hectare. The *haryali* guidelines were replaced by the common guidelines in 2008, which introduced six major changes.^a

3.2.2 Nepal

Soil and water conservation interventions were initiated for the first time in Nepal during the third plan period (1965–70). A systematic approach to WSM was first adopted in 1966, when the United Nations Development Programme (UNDP), FAO, and the Government of Nepal jointly initiated a pilot project called Survey and Demonstration for the Development and Management of the Trishuli Watershed, which was implemented through the Department of Forests. This project lasted for 4 years and carried out diversified activities with an aim to serve as a demonstration scheme for identifying the most suitable approach to mountain area development (Singh et al., 2004). With the establishment of the Shivapuri Watershed Area Development Board in 1976, soil and water conservation extension and

^a The common guidelines have introduced six major changes, viz., (i) creation of national rain-fed authority (NASDORA); (ii) enlarging the size of watershed and making the micro-watersheds part of a mili watershed (4–10 thousand ha); (iii) adding a livelihoods component with financial allocations and making it a comprehensive rural development program; (iv) increasing the duration of the program from 5 to 8 years; (v) special provision for women and weaker sections by providing 50% and 33% quota, respectively, in Village Watershed Committee (VWC) and also the creation of women watershed councils; and (vi) doubling the financial allocation, i.e., from Rs. 6000 to 12,000 per hectare.

education programs were promulgated across the country and 14 watershed projects were implemented.

People's participation was introduced during early 2000s with the introduction of Forest Sector Policy in the year 2000. Nepal has attempted to adopt a holistic approach to WSM integrating forestry, agriculture, pasture and water management, with an objective of sustainable resource management (Pandit et al., 2007). In the present context, watershed management is not only for managing or conserving natural resources in a holistic manner, but also for involving local people for betterment of their lives. In Nepal, watershed management is more focused on local people's livelihood needs rather than water quality and supply, which is the case in the developed countries (Tiwarei et al., 2008).

3.2.3 Pakistan

Two-third of land in Pakistan is used only for grazing by domestic animals. Range lands support a substantial portion of the yearly forage demand ranging between 50% in Hazara region to over 70% in Baluchistan. These range lands are highly degraded and produce hardly 10%–50% of their original productivity potential. Deterioration in range land productivity has naturally resulted in reduced quantitative and qualitative production of range livestock and their products (Sheikh, n.d.). Though the soil and water conservation department was established in 1951, during the third 5-year plan (1965–70), an area of 2000 sq. mile was covered under watershed implementation (Khattak, n.d.). Pakistan Agricultural Research Council (PARC) and Pakistan Poverty Alleviation Foundation (PPAF) fund localized water storage, water conveyance, and water distribution systems, yet there is a dire need for holistic adoption of watershed management approaches, based on resource integration concept and practices.

The initial WSM programs were initiated in the catchment areas of irrigation reservoirs, viz., Mangala/Tarbela/Rawal/Shahpur Dam WSM programs (Ahmad, 2001) to check rapid siltation of reservoirs. The main focus has been protection of mountain regions from soil erosion to prevent silting of reservoirs. In the process, the interventions provide socioeconomic and livelihood benefits as well.

3.2.4 Bhutan

WSM in its modern or comprehensive form is relatively of recent origin in Bhutan, though it is part of a number of legislations since 1974 (National Forest Policy). Even the Constitution of Bhutan mentions about watershed

management (article 5) followed by most of the recent policies and acts (Bhutan 2020; Land Act, 2007; Bhutan Water Vision 2025; Bhutan Water Policy, 2008 and Bhutan Water Act 2010). But none of them have provided any clear guidelines and objectives or institutional framework for implementing the program. Watershed management was part of many activities and programs implemented by different departments. And there is no specific allocation of resources for watershed management and lack of emphasis on ground-level coordination (Tsering, 2011).

The WSM Division (WMD) was established under the Department of Forests and Park Services. WMD is the nodal agency at the national level for operationalizing the WSM programs as part of a larger initiative of river basin management in the country. The main objectives of the program include sustaining the flows of natural resources and better stewardship of watersheds providing the country and its people with goods and services in ways that maintain the long-term productive capacity of natural resources without damaging the environment (Tsering, 2011). Prior to 2009, WSM projects were implemented with donor support. These include the Wang WSM project (WWMP) supported by European commission and Lingmutey Chhu watershed project (LCWP) supported by the International Development Research Centre (IDRC) and the Swiss Agency for Development and Cooperation (SDC) (Singh and Karki, 2004). These programs did not have any common objective or framework.

3.2.5 Sri Lanka

WSM approach was not inbuilt in Sri Lanka's natural resource management policies till 1970s, though soil and water conservation interventions date back to precolonial period. The soil conservation act was introduced in 1951 (Gunawardena, n.d.). Most of the investments were made toward rehabilitating the tank systems. This has resulted in the neglect of their catchments. This led to increase in runoff and siltation of tanks, canal systems, and the major reservoirs. An immediate and significant impact was on the reduction in the capacity of the country's hydropower generation capacity (80% of installed capacity depends on hydropower). In fact, a severe drought in 1995 had reduced the GDP growth by 1.5% largely due to reduced electricity generation in the hydropower plants. The degradation of watersheds and the siltation it causes also reduce the capacity of irrigation canals and the availability of water.

The regulatory measures adopted to control soil erosion coupled with limited interventions failed to control soil erosion due to the increasing demands on land. This has led to a policy shift toward the broader issue of environmental protection and management. This led to the development of a more comprehensive watershed-based action program (Murray and Little, n.d.). Thus, only during the late 1970s, the first holistic, broad-based watershed management projects were initiated in Sri Lanka. Initially these projects were implemented by the State institutions and later shifted to more participatory approaches (Gunawardena, n.d.). Besides, Indian government currently spends US\$300 million per year on integrated WSM incorporating small-scale farmer managed soil and water harvesting devices implemented in collaboration with community-based institutions. The WSM policy was introduced in 2004 and number of projects were taken up with the support of donors.

3.2.6 Bangladesh

Given the geographical and biophysical features of Bangladesh, WSM can be a developmental priority in the upland regions of Chittagong region. However, the development plans of Chittagong did not have a watershed component. Though some of the departments associated with forest department (Bangladesh Forest Research Institute and the Bangladesh Forest Academy) carry out training courses on WSM, they are not involved in implementing the watershed projects. The Chittagong Hill Tracts Development Board (CHTDB) too has no specific WSM program though it worked in collaboration with the International Centre for Integrated Mountain Development (ICIMOD) on establishing run-off and erosion monitoring plots (Misbahuzzaman, n.d.). Of late, WSM has evolved to respond to the complex challenges of natural resource management in the Chittagong hills. These projects focus on enhancing agricultural productivity and livelihoods through soil and water conservation (SWC) interventions. Watershed communities along with local government institutions/nongovernment organizations (NGOs), etc. are recognized as stakeholders (Misbahuzzaman, n.d.).

3.2.7 Afghanistan

Afghanistan is at early stages of planning and designing a developmental path after decades of war and civil disturbances. Land and water resources are

degraded, affecting agriculture as well as livestock production. It is observed that during the last two decades 70% of the forest area was lost, livestock population was reduced by 60%, and agriculture production was halved (Renner, 2010). Possibly with the American and other international communities' collaboration/assistance, the importance of WSM was recognized soon after returning to normalcy from war. Afghanistan has prepared a watershed Atlas for the entire country in 2004, which reflects the importance accorded to WSM. While the importance of WSM is well recognized at policy level, it has a long way to go in terms of developing capacities, institutional arrangement, resource allocation, etc. At present, number of donor-funded WSM programs are being implemented.

3.3 Watershed structures

The technical interventions of WSM include soil conservation practices, vegetative cover, afforestation, contour bunds, water harvesting structures (farm ponds, check dams), field *bunds* (raised edges), ridge bunds, etc. All these interventions are expected to facilitate higher land productivity through improved overall ecological conditions such as moisture and water availability for agriculture. Nature and intensity of interventions vary according to the hydrogeology and biophysical conditions of the region or watershed. The interventions can be grouped under three broad groups (i) soil conservation; (ii) in situ moisture conservation and (iii) water-harvesting structures.

3.3.1 Soil conservation

Majority of soil conservation programs instituted in the 1970s and 1980s were dominated by engineered systems. These systems were originally developed for large land holdings in temperate regions (Doolette and Smyle, 1990). Most popular ones in south Asia include: (a) rock and spill drains—graded drain, which is usually built along contours and acts by capturing runoff in small stilling ponds, which allows the rain water to infiltrate slowly; (b) stone walls—constructed along contours in fields and provide irregular form of terracing; (c) bench terraces—construction of large benches on steep slopes and cultivation may be carried out on slightly downward or back sloping surfaces; (d) bunds—artificial embankments constructed to intercept rainfall and sediments and lead runoff away from the cultivated land.

These interventions are widely used across South Asia though they are mostly implemented on the common lands and steep slopes. Besides, these approaches are commonly used in the centrally managed tea estates

in Sri Lanka, where land is not in short supply and valuable topsoil can be sacrificed for the construction of bunds and terraces (Carson, 1989; Doolette and Magrath, 1990). Pebble bunding is popular in the regions where soil quality is poor and crop lands are covered with pebbles. Clearing the crop lands of pebbles and using them to make bunds across gullies and small streams observed to serve double purpose of improving the quality of land and checking soil erosion (Reddy et al., 2010a).

Maintaining the vegetative cover is an effective way of reducing rain water runoff and soil erosion. In fact, it is observed that vegetative cover is more effective in soil erosion control as well as in reducing catchment yields. Calder (1991) has estimated that afforestation will reduce river flows in the order of 200 mm/year (or 2000 cubic meters/ha/year) in Sri Lanka. Afforestation is also widely adopted in the watershed management, especially at the ridge locations. Afforestation and forest conservation measures are extensively used in the hill terrains of Nepal, Bangladesh, and Pakistan. Their popularity in South Asia is mainly due to the small size of holdings. Either these interventions are capital intensive or land intensive or both. Often governments provide incentives or subsidies to promote on-farm soil conservation activities. But they do not sustain once the incentives dry up.

3.3.2 In situ moisture conservation

Number of interventions are adopted to increase in situ soil moisture content. These activities are most widely promoted and adopted measures in India, especially during the initial years of 1970s and 1980s. These include farm and contour bunding to increase soil moisture within plots of land by reducing the run off. These interventions help retain the rain water within the farmers' field in the arid and semiarid zones, where annual rainfall is low (200–600 mm). These interventions, however, are land intensive and hence are not favored by small and marginal farmers. For, in the case of very small plots, the loss of area offsets the yield gains. With the declining farm size, these measures are least preferred by the farming communities. But for the land constraint, these interventions are observed to be very effective in the arid and semiarid regions. In India, these interventions are implemented with 90%–95% subsidy.

Agronomically, there are a number of farming practices that can help increase soil moisture content and enhance crop yields. They include vegetative soil cover, mulching, use of simple tillage practices, contour cultivation, ridging across the slope, vegetative barriers, ripped furrows, land leveling,

level pans, and terracing. These practices, however, are only recommendations and not implemented as part of watershed program. Number of research studies have shown that these practices enhance soil quality and yield rates (for detailed review see Doolette and Magrath, 1990).

3.3.3 Rain water harvesting

Of late, rain water harvesting (RWH) is gaining popularity among local communities as well as policy makers. Often, this specific component draws a substantial share of the fund allocation. For instance, in India, the density and size of RWH structures has been on the rise during the last two decades, despite the fact that they are effective only during good rainfall years. The structures include check dams; farm ponds; percolation tanks or pits; recharge wells; and injection wells. All these interventions help recharge of groundwater if geology is favorable. While check dams and farm ponds are part of water-spreading methods, which serve the purpose of recharge as well as direct use of water, percolation pits/tanks, recharge wells, and injection wells are used for recharging the groundwater.

Adoption of these methods depends on the location (upstream/downstream) within the watershed as well as the hydrogeology of the location. In a ridge to valley context of watersheds, it is often recommended that in situ moisture conservation measures and water spread methods (farm ponds and check dams) in the middle and downstream locations. From the hydrogeology perspective, moderate-to-deep weathering and fracturing zones are suitable for artificial recharge through water-spreading methods; areas with deep fractures suitable for artificial recharge by injection methods; and areas with very shallow basement are not suitable for any intervention (Reddy and Syme, 2015). Minipercolation and percolation tanks are effective on the first- to third-order streams, and when the topography becomes plain, check dams are more effective. The interventions that are useful in the weathered zone are check dams, percolation tanks, and farm ponds.

The RWH structures produce more perceptible impacts. The visible collection of water at the check dams and the impact on the surrounding wells attract local community's attention. As a result, farmers demand more of these structures, as these structures can't be built by individual farmers due to their high capital costs. Besides, check dams are constructed on natural streams, which are common property. Even the implementing agencies are leaning toward creating more of these structures owing to the demands from the communities and their quick and visible impacts. However, the impact of these structures is location specific and hence is not equitable in

terms of spatial distribution of benefits. Moreover, their impacts could be very limited when they are constructed in the absence of hydrogeological information of the watershed.

3.4 Impacts and equity

Measuring the impacts is becoming more complex in recent years as watershed development programs have transformed from a soil and water conservation program to a comprehensive rural development and livelihoods program. Hitherto, watershed impact assessment studies have focused on the socioeconomic and natural resource impacts (Reddy et al., 2010a; Joshi et al., 2004). With the introduction of the livelihoods component, impact studies have started using the sustainable livelihoods (SL) framework to assess the impacts (Reddy et al., 2004; Reddy et al., 2008). SL framework incorporates the social, human, and physical (capitals) dimensions of poverty, which are long term in nature. But, not much attention has been paid to assess the resilience aspects of watershed development in the literature. Nature of impacts and benefits varies across the countries of south Asia, as their priorities and interventions differ (Table 3.2).

3.4.1 India

An overwhelming majority of the studies have endorsed these programs in terms of costs and benefits in India. Some of them also highlight the less quantifiable ecological benefits (see for review Reddy et al., 2010a). Positive impact of watershed development programs on crop yields, cropping intensity, and cropping pattern changes is mainly highlighted though there are variations in the magnitude of impact across regions and crops. Recent years have revealed stabilization of B-C ratios at around 1.75.

Although the economics of watershed technology is unambiguously in its favor, the magnitude of its impact differs across regions and locations (Joshi et al., 2004). The impact of watershed technology is observed to be more effective in scarcity regions when compared to assured rainfall regions (Deshpande and Reddy, 1991), though the absolute benefits are more in the assured rainfall regions (Joshi et al., 2004). On the other hand, adoption of the technology itself might be a difficult proposition in extreme scarcity conditions, as poor households living on the margin can hardly afford to follow conservation practices such as halting grazing their animals (Singh, 1991). The overall picture indicates that the success rate in some of the states is as low as 20%–25%.

Table 3.2 Impacts of watershed management interventions across South Asia.

Country	Natural resources	Economic	Social & institutional	Overall livelihoods impacts (magnitude)	Remarks
Afghanistan	Improved vegetative cover; number of tree species	Improved fodder availability	Community managed grazing (social fencing)	–	Very few and not comprehensive
Bangladesh	Reduction Jhum cultivation; improved forest protection	Improved livelihoods	Creation of village community forest communities	–	Very few studies
India	Improvement in the resource base, especially groundwater. Increased moisture availability and reduction in soil erosion	Positive benefit cost ratios; increase in net income and employment	Strengthening of participatory institutions. Improved gender participation	Good impact on natural, financial and social capitals	Wide variations across the regions. Overall success rate is very low (20%–25%)
Nepal	Checking forest degradation. Soil erosion and siltation declined Vegetative cover improved	Crop intensities increased; cropping changed to high value crops; yields increased	Education and health improved. Participation has increased; social cohesion increased	Improvement in all capitals Household income doubled in some cases	Not much variation across the studies
Pakistan	Reduction in soil erosion (21%) Reduced sediment (38%)	Improved yield rates of wheat, groundnut, fodder. Increase in income	Increased participation—including women	–	Not many studies. There could be selection bias
Sri Lanka	Reduced runoff and sedimentation in reservoirs	Improved power generation. High IRR	Low participation. Lack of institutions	Limited	The focus is not enhancing the livelihoods of the communities

Source: Based on the studies quoted in the text.

3.4.2 Nepal

WSM projects implemented in Nepal have focused on rural development as well as the protection of watersheds for hydropower development. In Kulekhani and Phewa Lake watersheds, watershed management activities have been linked with hydropower development. It is observed that halting deforestation and restoring the degraded natural environment were possible through community development activities for the upgrading of living standards of rural communities based upon their needs and initiative, promoting participatory decision-making processes, and paying due consideration to women and the rural poor (Acharya, 2000). WSM program has contributed to income growth, increased well-being, reduced vulnerability, improved food security, and more sustainable use of natural resources. It contributed to all livelihood assets of the local people (Thapa, n.d.). In the case of Phewa Tal, watershed fodder and fuelwood productivity has doubled when compared to formerly government-controlled protected forest. Agricultural productivity on terraced farm land has increased to provide sufficient food for a 36% increase in population between 1981 and 2001, with little or no increase in the area. More children, in particular girls, attend school than 30 years ago (Fleming and Fleming, 2009).

Participatory approach to WSM program appears to be contributing to the development of all the five capitals in rural areas (ICIMOD, 2007). Different components of WSM, viz., conservation farming, agroforestry, and conservation engineering have positive impacts. The individual farm approach in the Bagmati Integrated WSM Project (BIWMP) has raised the household income through integrated farming (multistory cropping, vegetable growing, and livestock rearing). In Udaipur, Siraha, and Saptari districts, poor and marginalized communities have benefited through agroforestry-based income-generating activities. Similarly, in Jhikhu Khola watershed in Kavre district, growing of grasses in private lands has reduced the workload of women and children for feeding their cattle (ICIMOD, 2007). Conservation engineering activities such as construction of water harvesting-catchment ponds, irrigation channel improvements, water source protection, river and stream embankments, and forestation on degraded land in the foothills and river flood plains have improved the groundwater water yield—both quality and quantity—in watershed program areas (Merz et al., 2003).

3.4.3 Pakistan

ICARDA (2010) using climate data from 2009 estimated that with protection structures have reduced the annual runoff by 28%. Retention of

rainwater in the watershed has improved leading to increased crop yields. Average soil loss was reduced by 21% through soil conservation structures on agricultural land. Watershed interventions have helped increase the average yield of rain-fed wheat by 31%. Agronomic practices like raised bed sowing has resulted in 23% increase in wheat yields and net income by 30%. Similarly, net income from groundnut has gone up by four to seven times with improved practices under WSM. Yield rates of both summer and winter fodder have increased by more than 30%. Shift toward high-value crops was possible wherever water is available (ICARDA, 2010).

A comparative study of two watersheds in the subtropical scrub zone of northern Pakistan showed reduction in runoff and sediment yield by 55% and 78%, respectively (Hanif et al., 1990). In another comparative study, over a period of 9 years, there was 33% decrease in the runoff and 52% decrease in sediment release due to treatment of the watershed. Similar observations were made in the case of Rawal watershed (Bashir et al., 2013). A study to assess the interventions like construction of engineering structures, contouring, terracing, tree planting, and land management observed that the average net income rose from US\$6.3 to 36.0 per hectare (Sheikh, n.d.). The Hilkot participatory WSM program led to increase in productivity and livelihoods of people. Economic improvements include doubling of wheat and paddy yields; increased employment opportunities, particularly for the landless and small farmers; and reduction in migration (Shah, 2008).

3.4.4 Sri Lanka

WSM programs in Sri Lanka have mainly focused on reducing soil erosion and siltation in the reservoirs. Changes in the adoption of practices, including engineering measures, tree planting, relevant market development, policy changes, etc., and their impacts could be taken as the intermediate benefits (Abernethy and Wijayaratna, 1998). Economic valuation of the Sri Lanka Upper Watershed Management Project (n.d.) highlighted the importance of protecting reservoirs for hydropower generation. The Project recommended the Government to regulate cultivation and agricultural activities on hills with a slope more than 60%. It was observed that the UMA-OYA upper WSM project has improved the educational levels of households resulted in the adoption of conservation practices. At the same time, conservation practices are not directly linked to farming (occupation) or land ownership (Jayaweera et al., 2004). It was observed that participatory

WSM is effective in achieving improved crop production and household incomes though number of them have struggled to get effective participation. This is mainly attributed to lack of proper institutional arrangements and coordination between line agencies and communities. On the contrary, in some of the projects, the participatory approach has increased people's expectations and dependence on line agencies (Wimalasinghe and Wijayaratne, 1998).

3.4.5 Afghanistan

WSM in Afghanistan is at an early stage of implementation. Some of the earlier initiatives with donor support are limited to specific interventions in the upper watershed areas, viz., reforestation and range land rehabilitation. While such initiatives are critical to long-term success in many areas, benefits may take several years to accrue. It is argued that smaller-scale projects with tangible short-term results would be more useful for the local communities (Groninger and Lasko, 2011). Another study on social fencing initiative with community collaboration facilitated by an NGO in the Pushtun Zarghun District has provided positive evidence in the context of integrated WSM. Vegetative cover increased from 5% to 48%, number of plant species increased from 10 to 31, and fodder availability went up from nil to 202 kg/ha. This has lowered surface wind speeds and significantly reduced wind erosion. A side effect has been an increase in wildlife and the Department of Agriculture has declared the zone as a nonhunting "Nature Reserve" and the blown sand problem had ceased in 4 years (Virgo et al., 2006).

3.4.5.1 Hydrological impacts

Although hydrological change is integral to WSM, hydrological impacts are not studied widely. Impact assessments have mostly focused on socio-economic or biophysical aspects. Most of the countries in South Asia have focused on upstream WSM in terms of improving the vegetative cover in order to reduce runoff and sedimentation. Soil conservation and water-harvesting measures and their impacts on surface and subsurface hydrology are not given due importance in impact studies. As a result, watershed planning and designing have failed to integrate hydrogeological aspects. One reason could be the scale of watershed is not big enough to integrate hydrology and hydrogeology, as in some of the south Asian countries the focus has been on microwatersheds, especially after the 1990s. Moreover, the purpose of WSM in most of the countries is reduction in soil erosion

and sedimentation. Though the aspect of groundwater improvement is integral to WSM in India, hydrogeology aspects are not taken into account while designing watershed interventions. This has given rise to issues pertaining to the nature and intensity of impacts. For, operating at the microwatershed scale does not necessarily aggregate up or capture upstream–downstream interactions.

WSM interventions may prove detrimental to downstream areas. Research has showed that the microwatershed approach may be producing hydrological problems that would be best addressed by operating at a macro-watershed scale. For example, in the Indian context, [Batchelor et al. \(2003\)](#) and [Kumar et al. \(2006\)](#) documented that successful water harvesting in upper watersheds came at the expense of lower areas within the river basin. Even the interventions like rain water harvesting structures could harm the interests of downstream communities, especially in the low rainfall regions ([Ray and Bijarnia, 2006](#)).

With the worsening of the groundwater conditions in downstream, more intensive drilling of wells is needed, which the poor could not afford, leading to inequitable distribution and use of water ([Calder, 2005](#)). [Calder et al. \(2006\)](#) cite this as “catchment closure,” wherein upstream water harvesting accumulates groundwater locally and then intensive pumping depletes the shallow aquifer thereby depriving the downstream areas of both surface runoff and groundwater. As the size of watershed increases, the influence of land use on the upstream—downstream hydrology reduces while the influence of precipitation increases ([FAO, 2006](#)). A recent study at sub-basin scale has also observed that watershed interventions have caused water insecurity downstream, though they have benefited the onsite communities ([Malano et al., 2015](#)). Thus, while addressing socioeconomic considerations favors small microwatersheds as the unit of operation, approaching this hydrological problem calls for working in large macrowatersheds and the two may be inconsistent ([Kumar et al., 2008](#); [Ray and Bijarnia, 2006](#)).

In the case of Sri Lanka, land cover changes (from forest to tea gardens and home gardens) have altered the flow regimes. The observed adverse environmental impacts were directly related to changes in flow regimes. Rapid runoff was responsible for high soil erosion, loss of land productivity, and frequent flash floods. The high rate of soil erosion has caused degradation of stream channels, increasing the likelihood of flash floods, reduced land productivity in rice fields with deposition of coarse material and silting of irrigation canals. During dry spells, relative droughts and irrigation water

shortages have occurred. Reduced lean season flows in downstream have threatened the dependable supply of good quality water and increased the salinity intrusion at the river mouth, whereas increased high flows have aggravated the flooding (Elkaduwa and Sakthivadivel, 1998).

3.4.5.2 Who benefits

Participatory WSM implies a fundamental concern for ensuring equity in benefits. While it is desirable to involve all sections of the community, WSM by itself does not guarantee the distribution of benefit flows across the community. For, watershed is a land-based technology and hence most of the benefits accrue to landed—particularly those best placed to pump the augmented ground water. Though landless households are expected to benefit to some extent, through employment opportunities, the type and magnitude of benefits accruing to them are poorly understood. Even if the watershed covers the entire village lands, it might leave sections of dissatisfied households, as not all interventions produce private benefits. Under such situation, it is unlikely that they will participate or evince any interest in the program. Their apathy toward the program might jeopardize the sustainability of the program.

The distribution of economic benefits across socioeconomic groups holds the key to the success of WSM. Joy and Paranjape (2004) have observed that the distribution of direct and tangible benefits is often discriminatory and limited, even in some of the most “successful” projects. The evidence not only indicates little impact on equity; sometimes, they point to increased deprivation for women/poor in terms of their access to resources in addition to further workload for project activities (Shah, 2009).

Many scholars observed that WSM favors the landed and those having land in the lower reaches as well as those who have the ability to invest in wells and pumps (Arya and Samra, 1995; Adolph and Turton, 1998; Kerr et al., 1998; Reddy et al., 2001). A study by Reddy et al. (2010b) in the context of Rajasthan points toward a disturbing fact that benefits from WSM in poor and backward regions are not only low but are mostly cornered by large farmers resulting in the aggravation of inter- and intraregional inequalities. In a study of Orissa and Andhra Pradesh (Rout, 2013), participation was observed to have enhanced the benefit flows, but it could not ensure equitable distribution of the benefits. Equity issues arise even in the spatial context, i.e., downstream locations benefit more when compared to upstream interventions (Reddy and Syme, 2015).

The review of impacts and benefits of WSM clearly brings out that the economics of watershed technology is unambiguously in its favor across south Asia, though the magnitude of its impact varies across the countries and locations. The impact of watershed technology is observed to be more in scarcity (low rainfall and irrigation) regions when compared to assured rainfall regions and the absolute benefits are more in the medium rainfall zones. For, adoption of the technology itself might be a difficult proposition in extreme scarcity conditions, as poor households living on the margin can hardly afford to adopt conservation practices such as losing part of their land for contour bunding, etc. Adding to this is the long gestation in getting the benefits from the technology. This has led to the increasing demand for rain water harvesting structures to the neglect of soil conservation in countries like India. Thus, adopting appropriate and scientific designing and implementation is the key for ensuring its effectiveness.

3.5 Watershed institutions and implementation

Collective participation and action of the community is a critical ingredient for successful WSM. Given its relatively long gestation period of 5–7 years, it is necessary not only to involve the community but also show benefits (tangible economic) to all sections of the community even in the short run. Evolution of appropriate institutions plays a critical role in the implementation and management of watershed interventions. Institutions are required at various (policy to village) levels. Except in India and to some extent in Nepal, watershed institutions have not evolved much in South Asia, though most of the countries have established specific departments for implementing watershed programs at the national level. Institutional evolution is evident in some countries where watersheds were implemented through donor support.

3.5.1 India

Institutions are put in place at various levels to implement the program across the states. The present institutional arrangements are evolved over the years with successive guidelines recommending improvements over the earlier ones. While the central-level institutions were established in the form of ministries and departments during the 1980s, the state, substate, and village-level institutions have their systematic beginnings during the mid-1990s with the introduction of participatory watershed guidelines (GoI, 1994). At the national level, watershed development was brought under the ministry of

rural development, though different states have put it under different departments, viz., agriculture, forestry, etc. Different institutional modalities were tried with limited success, mostly at the district and village levels between 1994 and 2006 (Reddy, 2006).

New guidelines (known as common guidelines) introduced in 2008 increased the size of the watershed (from 500 to 5000 ha) and tenure (4–7 years) of the program and renamed the program as integrated watershed management program (IWMP). IWMP is placed under a newly created central rain-fed authority, while keeping the program under the administrative control of the ministry of rural development (GoI, 2006). Besides, all the watershed programs that are being operated under different departments were brought under the department of land resources (DoLR). The enhanced size of the watershed required further changes in the institutions at the village level, as it extends beyond the village. The state governments are given the flexibility to adopt their own approaches. In 2014, IWMP was brought under an umbrella program named as the *Pradhan Mantri Sinchayi Yojana* (Prime Minister Irrigation Development Programme) along with other programs like irrigation and employment program (MGNREGA) at the central level. The state-level and district-level institutional arrangements remained as under IWMP.

Under the IWMP, a bottom-up approach of creating user groups in each watershed and also supporting the self-help groups (SHGs) is existing at the village level. While user groups (UGs) are part of the watershed committee, SHGs are part of the village organization that is being created for the overall development at the village level. Watershed committee takes on an active role in the implementation. Though the actual size of the watershed spreads over 8–10 villages, each village will have similar groups and the implementing agency would take their help in implementing the program in the respective village. This is known as cluster approach and most states adopt this approach. This approach makes the task of participation and collective action easy in each village, though coordinating between the villages is complex.

All the projects at the district level are coordinated by the district water management agency (DWMA). The state-level nodal agency (SLNA) is responsible for selecting the project implementing agencies and allocating the projects. SLNA is also responsible for capacity building of the implementing agencies and identifying new areas of intervention and research, if necessary. The state-level institutional arrangements are not very different from the earlier approach. The village-level cluster approach is new and

could prove to be difficult in terms of coordinating the activities across number of villages. Compared to this, the institutional functioning is much smoother in the case of micro (one village) watersheds. There are also issues regarding the sustainability of these local institutions beyond the implementation cycle, which needs to be addressed at the policy level.

As far as implementation is concerned, project implementing agencies (PIAs) are selected by the SLNA. The PIAs could be the line departments of the state government or the NGOs.^b PIA is responsible for implementing watersheds. PIAs will put up a team of experts including junior engineers, technical officer (institutions and capacity building), and a computer operator headed by a project officer. This team will support implementation of watersheds under the PIA in the district. At the watershed level, two technical officers (agriculture and engineering) would support implementation in each watershed. As per the guidelines, Rs. 12,000 (US\$ 185) per ha. is allocated, which is to be spent over a period of 5–7 years. Guidelines also prescribe how this amount is to be spent on different components. While administration, institutional capacity building, monitoring and evaluations and preparation of detailed project report are provided with 22% of the budget, actual watershed works (NRM) get 56% of the budget. Livelihoods support and production enhancement components also get a substantial portion of 19%. While the watershed works and production enhancement components benefit the landed households, the livelihoods component benefits the landless.

3.5.2 Nepal

Nepal is spearheading in community-based natural resources management in the South Asia Region. Nepal's participatory forest management policies are well known. Participation is mandatory in government policy in all the natural resource management programs. It has helped in bringing large rural communities, including women, into the mainstream of development (Tiwari et al., 2008). Initiation and implementation of the forest policy and programs adopting the principle of community-based decentralization has changed the scenario of the natural resource management and community mobilization in the rural areas. The institutional development of watershed management in Nepal more or less adopted the Indian path as far as participatory WSM is concerned. The Department of Soil Conservation and Watershed Management (DSCWM) is the principal authority for undertaking WSM. Similarly, district-level DSCWM are established

^b As per the guidelines, up to 25% of the projects can be given to NGOs for implementation.

(Sthapit, n.d.). During the Eighth Plan (1992–97), the DSCWM brought out program implementation strategies and people’s participation guidelines, which made provision for partnerships with NGOs and CBOs. This provision emphasizes the formation of user groups (UGs) and the need to involve them in planning, implementing, and decision making. This plan also includes group savings and credit mobilization (Pandit et al., 2007).

Basically, three phases are involved in the implementation of the WSM programs. These include: (a) identification of primary users and formation of a committee as well as watershed planning; (b) implementation; and (c) monitoring of planned activities. District soil conservation officers (DSCOs) identify primary users, as well as their priority issues (areas) and programs, through field-level consultations with stakeholders and communities. Then, DSCO officials and user groups jointly prepare an implementation plan, which lays down the activities, level of participation from users, government contribution, work assignment, and time schedule. User group (CDG) implements the plan after receiving approval from local government bodies, including Village Development Committee (VDC) and District Development Committee (DDC). DSCOs provide necessary tools, equipment, and technical and financial support to the users to implement the plan and monitor its implementation. The CDG makes internal rules and regulations on maintenance and benefit sharing among members, whereas the community development committee (CDC) implements these rules and also arranges local people’s participation in the program. Although implementation modalities vary between projects and agencies, generally the locally hired project staff facilitate program implementation.

The DSCWM has not been able to prepare participatory plans for areas larger than 2500 ha. While participatory planning for small areas is effective in addressing local issues, it fails to recognize the interests of stakeholders downstream and outside of these areas. Nonetheless, small watershed approach to WSM developed by the DSCWM has been found to be more successful. The DSCWM assesses land capability and encourages appropriate land use. It uses locally available, low-cost materials in the design and construction of structures, and it gains local cooperation for long-term protection of an area by increasing awareness of the need for resource conservation.^c In most of the WSM projects, a range of small-scale income-generating activities have been launched to benefit the poor.

^c Drawn from “Sector Assessment (summary): Watershed Management,” Building Climate Resilience of Watersheds in Mountain Eco-regions (rrp nep 44214) (<http://www.adb.org/sites/default/files/linked-documents/44214-024-nep-ssa.pdf>).

In addition, savings and credit groups, mothers' groups and disadvantaged groups of the poor have been formed and economic program packages are introduced to strengthen their capacity and expand their economic activities (Pandit et al., 2007).

Though the importance of integrated WSM is well recognized at the policy level, institutional and operational capabilities are lacking. The human and financial constraints are hindering the coverage of watershed programs. Despite the anomalies in fund allocation and releases, implementation of activities by the communities provides an opportunity to spread the program over a larger part of the year by better utilizing unused labor available from the agricultural cropping calendar. Moreover, currently the program considers the political as well as social boundaries rather than hydrological. The activities are often carried out outside the drainage boundaries (Tiwari et al., 2008).

Except for India and Nepal, none of the other countries in the region have formulated systematic guidelines from national to village level. In fact, the absence of such institutional set up is the main reason for low adoption of WSM projects (Baloch and Tanik 2008; Gunawardena, n.d.). While Sri Lanka has a watershed policy and guidelines, Pakistan and other countries are yet to formulate their watershed policies. Sri Lanka though is moving toward people-oriented policies, and they are not backed by institutional arrangements. As per the national watershed management policy, the WSM committees under the chief provincial secretaries would coordinate the activities of all agencies at the rural, divisional, district, provincial, and national levels (Gunawardena, n.d.). Afghanistan has introduced participatory management of watersheds during 1990s but could not provide appropriate policy and institutional support (Ahmad and Wasiq, 2004).

Thus, countries in the region are at different levels of institutional arrangements for implementing WSM programs. Even in the countries with appropriate institutional arrangements, the implementation of watershed interventions is neither scientific nor comprehensive. All the countries are moving toward participatory approaches. Participatory approaches have to be backed by appropriate institutional framework in order to achieve the objectives. Implementation of the programs for enhancing the livelihoods of the communities needs to strengthen both technical and institutional aspects. While countries like India and Nepal are yet to strengthen the technical aspects in terms of integrating hydrogeology and biophysical aspects into watershed design, others need to look at these aspects as they move toward formulating watershed policies and watershed institutions.

3.6 Lessons for Afghanistan

Most of the South Asian countries adopted WSM to address problems of land degradation and reservoir protection earlier like the developed countries of Europe and Americas. However, India has adopted WSM with a different objective and approach. It has moved away from scientific management of catchments to protecting and enhancing the land productivity in the poorly endowed regions focusing on small hydrological units. Further, WSM is viewed as a technological strategy for these regions and accorded high policy priority and fund allocations. In the process, the scale issues of WSM are largely neglected to achieve smooth implementation, as participation of local communities in the program is recognized as critical for its success. Microwatersheds are taken up at the village level for better social organization (participation). The focus on social aspects of WSM has led to evolution of the program into a more comprehensive rural development approach of integrating livelihoods and production enhancement components. Though number of watersheds covering large areas are being identified and implemented, the technical aspects are not taken into account while selecting the watersheds for treatment. As a result, the effectiveness of these interventions has been limited despite better social or institutional outcomes. India's approach in WSM is considered effective in government policy circles as in addressing the rural livelihoods as well as resource degradation issues. The participatory and livelihoods approach to WSM is now being adopted in Nepal, Sri Lanka, and Pakistan. Bhutan continues to focus on basin/catchment management.

Thus, the experience of South Asia in WSM suggests that it can be adopted as an effective technology for addressing the broader aspects of soil and water conservation as well as productivity and food security in arid and semiarid regions. Given the high proportion of agriculture in these regions, WSM can provide a win-win situation when the broader aspects are integrated. Afghanistan is well placed, like India, to adopt such an approach to protect its soil and water resources and enhance its production and productivity.

Afghanistan is characterized by low rainfall in most parts. It faces regional as well as seasonal water shortages. Extent of land degradation is high (35% of its crop and range lands). Studies have identified watershed management as a cost-effective short- and medium-term solution to drought mitigation as well as sustainable resource management. It is observed that

“watershed health and agricultural productivity issues are reducing opportunities for rural livelihood recovery in south-eastern Afghanistan” (Groninger and Lasko, 2011, p. 693). Hitherto emphasis has been on river basin scale with a focus on reforestation and range land rehabilitation. Therefore, there is immediate need for moving toward livelihood-oriented watershed management at smaller scale (less than 1000 ha) that can provide short-term benefits and increases the awareness among the rural communities (Groninger et al., 2010).

Though Afghanistan is unique in many respects, it can draw lessons from more than three decades of experiences of South Asian countries. The following aspects need to be considered in the context of Afghanistan:

- Given the low and medium rainfall, watershed interventions should be targeted toward enhanced livelihoods rather than improving the productivity alone. This would ensure broad-based benefit flows and strengthen the social acceptance and participation.
- Learning from the South Asian experience of aligning watersheds to hydrological boundaries would ensure sustainability and effective impacts. Afghanistan has already prepared the watershed atlas delineating the major watersheds and identifying smaller watersheds. The size of the watersheds needs to be smaller to make them socially feasible. Implementation of watersheds should be taken up in such a way that it would address both local (soil and water conservation, improved productivity and livelihoods) and basin-level issues (soil erosion due to wind).
- Participatory approaches need to be scientifically sound awareness building and improving their capacities to understand and adopt technically robust interventions rather than interventions that give quick and short-term benefits. Concerted efforts are required to increase awareness and gain acceptance for the interventions. Particular emphasis should be on hydrogeological and biophysical aspects.
- Resource sustainability and equity need to be built into WSM. While adopting scientific approach and choosing the right “scale” is necessary, it is not sufficient for addressing the sustainability. Any successful watershed intervention requires a combination of security/accessibility, clear land title and control, and appropriate geologic and climatologic conditions that will permit interventions to make a discernible difference (Groninger et al., 2010). Appropriate institutional arrangements for managing the resources need to be built around the existing institutions that are embedded in the culture of the land. For instance, Afghanistan has traditional irrigation systems like *Karez* and water institutions like *Water*

Waqils and *Shuras*, which are still functional. These institutions could form the basis for evolving watershed institutions.

- Afghanistan has limited capacities in understanding and implementing the WSM approaches. The implementing agencies in the government need capacity building at various levels.
- NGO sector needs to be encouraged to take part in implementing the WSM programs. Identifying right NGOs and encouraging them to participate in the process would be a good starting point. Selection of nodal NGOs at the provincial and national levels and capacitating them along with the key line departments should be the first priority. Networking of NGOs that are involved/interested in natural resource management and capacitating them is an effective way forward.

3.7 Policy imperatives

There is an immediate need for creating a policy environment and policies to initiate WSM program in Afghanistan. Providing a common framework for implementing the WSM programs should be the priority rather than leaving it to different funding agencies. Each agency comes with its own objectives and approaches. Often these agencies may strive to achieve diametrically opposite outcomes instead of working in tandem. A national policy with specific objectives could provide the direction so that goals can be achieved collectively. Given here are some policy imperatives for immediate attention:

- Formulating a national policy on WSM and preparation of guidelines for implementing the policy.
- Establishing appropriate institutions at the central level either by designating an existing department or by establishing an autonomous authority with roles and responsibilities to provide the policy directions, guidelines for institutional arrangements and implementation at the provincial level and below.
- Identifying the priority areas and allocating the resources is critical for achieving ecologically sound and economically efficient outcomes.
- Delineation of watershed boundaries is a necessary condition for implementing the program. This needs to be taken up at the national level.
- Establishing a national-level capacity building institution (in the lines of MANAGE, in India) or identifying some of existing institutions and strengthening them is a policy priority.

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