Community-based Natural Resources Management for Sustainable Development

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First of all, I would like to extend greetings to you all from the birthplace of Gautam Budha, Lumbini, Nepal. I wish peace and prosperity to you all.

I take this opportunity to thank the organizers of this important conference for giving me opportunity to be one of the speakers in this important international conference.

The theme that I propose to discuss here is the importance of community based natural resources management for sustainable development. Human beings by virtue of its sociable nature are dependent on community with collective and cooperative activities for mutual benefit called “social capital” which becomes the basis of sustainable development.

The three pillars of Budhism is “Budha, Dharma and Sangha”. Sangha is community for collective activities. Among three jewels of Budhism, Sangha is also equally important– Sangha is a word in Pali and Sanskrit meaning "association", "assembly", "company" or "community" and most commonly refers in Buddhism to the monastic community of bhikkhus (monks) and bhikkhunis (nuns). The value of community and community effort has been part of life in many Budhist countries.

Community development is important for strengthening civil society. They help deciding by themselves in the development of social, economic and environmental policy. Community development strengthens the capacity of people as active citizens through their collective groups, organizations and networks. It plays a crucial role in supporting active democratic life by promoting the autonomous voice of disadvantaged and vulnerable communities. Community development has a set of core values/social principles enforcing human rights, social inclusion, equity and equality and respect for diversity and local skills and knowledge base.

Good community development helps develop their ability and potential and enhance capacity to organize themselves to respond to their problems and needs. Communities that we are proposing here can control and use natural assets to promote social justice and help improve the quality of their community life. Good and strong community helps establish good communication with the government and works as the partner of the government policy by making effort to keep themselves autonomous and self-governing body.

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Community Based Natural Resource Management

Natural resource management deals with managing and interacting people and natural resources. The discussion in this paper focusses on the capacity of local community in managing and preserving those natural resources for the benefit of the community and country as a whole. For the purpose of this discussion, I would like to take examples of water, land and forest resources which are being managed by the community. The effort of the community is distinctive to maintain these resources sustainably for its community and for the nation. These natural assets are integral part of the life of the people. The access of these resources to the community and equitable sharing of them becomes the basis of sustainable community and development.

Community-based natural resource management refers to the collective use and management of natural resources in rural areas by a group of people with a self-defined, distinct identity, using communally owned facilities. Along with natural resource management, there is need to understand the community capacity development, governing mode of local self-government, and the creation of local institutions for managing common property resources. There are both financial and non-financial benefits of community based natural resources management. The important benefits of community-based natural resource management are the (a) empowerment of local people in rural areas, (b) conservation of biodiversity and (c) the development of more secure livelihoods and the reduction of risk. They make their rules and regulations to govern the natural resources. These rules and regulations can be of two types; (a) evolved from within community which have acceptance by the community and adhere those rules and regulations by the community. (b) The other type of rules and regulations are guided by the government but adopted by the local community. These rules and regulations are important to control the use of these resources and maintain the equitable distribution of these natural resources.

While setting the rules and regulations by the community for natural resource management, traditional local knowledge makes a considerable contribution. However, it is to be made clear that a community should not be fortified group not having any interaction with external agencies. The community must be able to develop capacity to decide what is useful to them and what is not. The external relation of a community should base on the merit for the benefit of the community members.

Assessment of the Status of Community for Natural Resource Management

How do we assess the capability of community? It will be useful to use livelihood framework based on those five capitals (DFID. 2000). Based on the assessment of those five capitals within a community, strategy for strengthening the community can be worked out. The five capital approaches are useful tool of analysis for livelihood status of the community. They are:

Natural Capital - water, land, forest and many natural resources. The availability of these resources determines the status of the community.

Physical Capital - physical infrastructure like canal, road, house, building, etc. They also indicate the status of the community.
Financial Capital - financial resources that come to community or go out of the community, the economic activities of a community

Human Capital - education, skill, knowledge know-how of local technology, etc.

Social Capital - cooperative effort for mutual benefit, trust among the members of the community.

There have been challenging arguments that natural resource management can not be safeguarded by common people hence there is need of strong central control for the conservation and utilization of those natural resources for the sustainable development of the community and the nation. One of the proponents of the need of central control of the resources was Hardin’s Tragedy of Commons which later on contradicted by Lin Ostrom.

The Tragedy of Commons

While there is tendency to believe that community can take care much better the community resource management, there is strong argument against the community stating that without strong control mechanism enforced by the government, there can not be conservation and promotion of natural resources. Hence, the government with strong enforcement rules and regulations alone will be able to preserve and conserve the natural resources.

The tragedy of the commons refers to a particular type of uncontrolled communal property management system (open access) where individuals try to gain as much as possible. In the short-term, people try to get advantage without taking longer-term needs and the needs of the group into account. In an open access situation, resources, by and large, become degraded through overuse by individuals because they put their own interests first. Some of the mechanisms that can be put in place to improve the sustainability of common property resource (natural resources) use and avoid an open access system are discussed below.

Writing in 1968, Garrett Hardin presented argument taking cue from population growth. He looked into the relation of population growth to resources. He concluded population must be brought under control. He then analyzed the dynamics that have caused population to swell. From this analysis, he proposed solutions.

Hardin employed a key metaphor, the Tragedy of the Commons (ToC) to show why population growth help accelerate the depletion of natural resources. When a resource is held "in common," with many people having "ownership" and access to it, Hardin reasoned, a self-interested "rational" actor will decide to increase his or her exploitation of the resource. This situation helps the individual to receive the full benefit of the increase resources. However, the costs of over-exploitation are spread among all users. The remorseless and tragic result of each person thinking this way, however, is towards the ruin of the commons. This will set bad precedence of overuse of resources by everyone. The straightforward application of the "herdsman" analogy to world population is that each couple expects to experience a large benefit from having another child, but only a little of the full social and ecological cost.
Hardin's key assumptions and problem formulation:

1. The world is biophysically finite.
2. Over-population is an example of the tragedy of the commons (ToC).
3. The "commons" system for breeding must be abandoned (as it has been for other resources).
4. The problem is then to gain peoples' consent to a system of coercion.

The evaluation of ToC suggests that the model of the ToC, while compelling, generalizes from a faulty historical case study. In fact communities managed their commons. The real humans are not that self-interested as to not care what their fellows think of them. They do take care of the concerns of their fellows stake as well. It is possible that communities do observe and regulate members' fertility, rather than leaving it up to individual.

In Hardin's classic piece “The Tragedy of Commons” is a natural resource shared by many individuals. In this context, "shared" means that each individual does not have a claim to any part of the resource, but rather, to the use of a portion of it for his/her own benefit. The tragedy is that, in the absence of regulation, each individual will have a tendency to exploit the commons to his/her own advantage, typically without limit. Under this state of affairs, the commons is depleted and eventually ruined.

“At the root of the tragedy is the unrestrained self-interest of some individuals. The underlying reasoning is that if the commons is eventually going to be used up, whoever effects the greatest use stands to benefit the most. Under this circumstance, it is seen that the benefit/cost ratio is astronomical: While the benefits accrue solely to the user, the costs are spread among all others sharing the commons.”

The following case studies show how the central control system of natural resources management had to change for decentralized community management.

(a) Community Forest Management Program

In comparison to the heavily top down state centered system of management of forest that was extensively promoted in 1950s, the trend has increasingly shifted towards encouraging decentralized local and participatory for of governance (Nagendra et. al. 2008)

Community Forest Program is an example of community based natural resource management in Nepal. Community based management of forest in the form of traditional or indigeneous system has a long history in the hills of Nepal. These forest management were under different institutional arrangements like Talukdar, Kipat and religious forest management. There were provisions of harvesting the forest products which was under heavy supervision and monitoring the community.

In 1957, Government of Nepal decided to nationalize all kinds of forest in Nepal. This government decision accelerated the deforestation process in Nepal. These forest and trees used to belong to private party and individuals harvested the trees and forest overnight. Rate of deforestation accelerated in high speed. Learning the bad lesson from
nationalization of forest in 1957, Government of Nepal introduced community forestry as a formal national forest management strategy in 1976. A National Forest Plan was conceived and implemented in 1976. This plan recognized the role of local community and promoted local participation in the forest management. Among different types of forest management, this paper focuses only on community Forestry Program. Community Forestry was the part of National Plan of Forestry Sector of 1989. The community forestry program was the largest program. This program encouraged the transfer of forest to the local communities for management and use the forest products for the benefit of the Community (Gautam and Shivakoti. 2008).

The National Forest Act of 1976 and its subsequent amendments of 1977 and 1978, attempted to address the limitation of nationalization of forest and return some degree of ownership and control over forest resources to the local people.

The modality proposed by the Forest Master Plan was that the part of the national forest will be handed over by the District Forest Officer (DFO) to the Forest Users Group (FUG). Before handing over the forest management responsibility to the community, the community should form a Forest Users Group (FUG) with defined stakeholders, responsibilities and benefit sharing mechanism. The income generated can be used by the FUG in any community development activities. The Government of Nepal has full support to this Program. The Community Forestry Program has dramatically expanded in terms both spatial and coverage and numbers of forests handed over to communities.

Record of Forest Department shows a total of 14,337 registered User Groups (including 1.65 million households). These forest Groups were managing 1.22 million hectare designated community forestland. This comes about 20.5% of countries forest area.

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<th>An Overview of Community Forestry Management in Nepal</th>
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<td>Total Community Forestry Groups:</td>
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<td>Total HH coverage:</td>
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<tr>
<td>Average HH/ FUG</td>
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<tr>
<td>Each FUG has population of</td>
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<tr>
<td>Total Population Coverage</td>
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<td>Coverage of Country’s forest area</td>
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Source: Forest Department, 2006. Community Forestry in Nepal, DoF, Babar Mahal, Kathmandu

Community-based forest management has been a symbol of Nepal’s advances in sustaining their forests and biodiversity along with the rural development. Nepal has practiced a number of different approaches to community based natural resource management. They include community forestry, buffer zones, conservation areas, leasehold forestry, protected forests, and collaborative forest management. Community-based forestry is the second largest and mainstream forest management regime after government-managed forestry. Local communities in Nepal are managing about one-third of the country’s forests, and the area under their protection has tripled in the past two decades. Community-based
management is the primary reason that forest degradation and loss has declined significantly overall and even reversed in many areas, particularly the mid-hills (Kanel and Kandel. 2004). After the advent of community forestry, forest cover has been rapidly grown which has helped in maintaining ecological balances in Nepal. More importantly, community forestry has contributed to decreased poverty and continues to contribute social development activities (Ojha. 2002). Community forestry appears to have had a net positive effect on livelihoods and a range of other development concerns in Nepal, resulting in direct and indirect positive impacts on rural livelihoods and welfare. Moreover, community-based natural resource governance structures have become more resilient during the period of political instability in Nepal. When other institutions and processes failed, communities continued to protect their forests and other natural resources. The Community Forestry program helped institutionalize community organizations at local level to manage the forest resources.

In the South and Southeast Asian regions, Nepal has taken a lead in initiating innovative policies on community forestry. The emphasize has been to decentralize and deregulate previously top-down policies, strengthen local institutions and ensure greater economic equity (Agrawal. 2001).

The following section proposes to highlight some of the similar examples of forest management from Thailand, Vietnam. Thailand used to have centralized forest resources management program. Social resistance took place against the centralized forest resources management. Community based forest management (CBFM) in Thailand had evolved through people’s movement to gain power and decision making control for forest resources in their locality.

In the case of Vietnam, forests have been under the state control since the reunification of Vietnam in 1975. From 1992, local households were involved with State Forestry Enterprises (SFE) in joint plantation and benefit sharing program. Later on, local people were allocated forestry land for long term forestry purpose. The government designed the forest allocation program to improve the forest protection by local people, who would protect it as their own asset with long term incentive. The Vietnam government intends to use “ownership” as one of the incentives to local people for long term management strategy.

It is observed that several forest systems have experienced changes in management type from state controlled system to joint management system or that of community managed forest systems either very recently or within the last two decades. The trend of change is quite clear that the community of local people have been brought in the forefront for the natural resources management.

(b) Farmer Managed Irrigation Systems: Examples of Community based Natural Resource Management

Another important natural resource is water use for agriculture purpose. Both agriculture and forest are important resources for assured livelihood of the people. People have been
using rivers and streams to divert water for cultivation of agriculture products specially paddy and other crops. Many socio-institutional and technical dynamics are involved in water resources management for agriculture. Hence, irrigation water management is to be analyzed from socio-ecological perspective.

Both in South Asia and Southeast Asian countries, there are different types of irrigation systems called agency managed and farmer managed irrigation systems. They have roles to be played by the local community at different degrees. Farmer Managed systems (FMIS) have more roles to be played by the community. This classification of the irrigation system is made based on the type of actors playing dominant role in irrigation water management. FMIS are also called as “community irrigation system” or “locally managed irrigation system” or “village irrigation system” or “traditional irrigation system”. However, the common features in all these names are the local farmers who have constructed and managed the systems. They have created rules and regulations and institutions appropriate to these irrigation systems.

During the course of discussion, it is proposed to use farmer managed irrigation systems as a case study of community based natural resource management. It looks simple when we see an irrigation system where there is flow of water going to agriculture farm. An irrigation system consists of hydrology, hydraulic, civil engineering, agronomy, sociology and end users (farmers and institutions). Who is going to make the irrigation system work and make productive. It is the farming community.

There are many rules and regulations, norms and values, institutions and actors in managing these irrigation systems. It is generally found that farmer managed irrigation systems perform better than agency managed irrigation systems in many Asian countries (Pradhan. 1989). The agency managed systems are constructed and managed by the government engineers.

The distinctive feature of farmer managed irrigation system, a mode of natural resource management, is the participation of the members of the farming community in management decisions. In an irrigation system managed by farmers, water for irrigation is considered a community resource. The decision regarding this water is to be made collectively by the farming community. Water is unifying factor that brings farmers to gather and they make collective decisions regarding acquiring, allocating, distributing and applying water for agriculture. FMIS can promote polycentric mode of governance in supporting equitable management of water.

**Distinctive Features of FMIS as Community Based Natural Resource Management**

The membership of an irrigation system managed by farmers either depends on landholding for irrigation or prior investment in the development of irrigation system. The members have both rights and obligations to be fulfilled in the management of the irrigation system. Free riders are not allowed in the system. They contribute labor for maintenance based on either size of land holdings or the volume of water right. There is no such thing as voluntary labor contribution in such system. Records of resource mobilization are kept. Defaulters are punished.
They have flexibility in making water available to the members based on the location or the type of the soil for irrigation. Those who do not use irrigation water are not usually the members of the system. Hence, the FMIS has defined number of membership within a defined hydrological boundary.

A General assembly is composed all the members of the system. The meeting of General Assembly takes place once or two times a year. They formulate rules and regulation, monitor the activities and elect the executive committee members for day to day supervision of irrigation activities. Rules regarding operation, maintenance and resource mobilization are agreed in the general assembly. These rules and regulations are to be abided by all. Non-compliance of these rules and regulations of FMIS will be subject to punishment as specified in the rules or on the basis of ad-hoc decision by the general assembly. By and large, decisions by the community are the basic feature of FMIS.

The executive committee is accountable to the general assembly. The transaction of all activities of the executive have to be transparent so that the members of the system have trust on the executive committee.

The water in the irrigation system is considered as a community resource, hence, the allocation and distribution of water will be done by collective decisions of the members of the Water Users Associations. The operation and maintenance (O&M) will be done collectively. Conflict resolution would be undertaken collectively by Water Users Association.

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<th>Status of Irrigation Systems in Nepal</th>
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<tr>
<td>Cultivable Land</td>
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<tr>
<td>Irrigable Land</td>
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<tr>
<td>Irrigated area</td>
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<td>FMIS</td>
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<td>AMIS</td>
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Nepal has 70% share of FMIS in irrigated agriculture. The systems are managed by the community of irrigators. Farmer Managed Irrigation Systems are found in India, Pakistan, Northern Thailand (Mungsunti. 2013), Laos PDR, Vietnam and Indonesia (Manor et. al. 1989). They are spread in many other countries in Africa and South America.

After World War II, many public sector irrigation systems were constructed and managed by the Irrigation Department. They were taken as government irrigation systems. In 1980s and 90s, the investors found that these systems were not performing well and infrastructures maintenance gradually deteriorated. Hence, the donors got concerned about the state of irrigation system performance. In order to address this issue. Participatory irrigation management was proposed where the farmers as an organized group (WUA) will participate in the irrigation management and take the responsibility of resource mobilization for maintenance. Participatory irrigation management is an effort to bring the irrigators community in irrigation water resource management. The participatory irrigation
management with the objective to have defined role of the community in resource management took different forms and methods. They are called joint management or management transfer etc. The central focus of all these programs is to bring the farming community back in the mainstream of natural resource management of irrigation systems. Many countries are now going through this program of management transfer.

The management transfer or joint management program visualizes that farming community through active Water Users Association (WUA) can improve the performance of the irrigation systems. The WUA under such system has to be self-supporting, self-governing and self-regulating one. If it becomes the extension of Department of Irrigation, it will not be able to act as a farming community representative, it will be only extension of Department of Irrigation.

It is found that concrete structures alone in irrigation systems can not bring increased agriculture productivity if active Water Users Associations are not in existence. Ostrom analyzed 135 irrigation systems both FMIS and AIMS and come to conclusion that the productivity of agriculture is better in farmer managed system than in agency managed system where they have concrete intake and lined canals. The farmers organization has more contribution for agriculture productivity than by simply adding concrete structures in the irrigation systems (Ostrom. 2002). Participatory irrigation management brings positive results in better water distribution in head, middle and tail and good coverage of irrigation water in the system (Joshi et. al. 2000). All these evidences show that the community can play positive role in natural resource management and provide the base for sustainable development. The lesson that we learn here is that the government intervention should be to help strengthen the local organizational capacity of the farmers from destroying their capacity and not to take the role of the community by the government.

(c) Example of Land Management: A Case from Nigeria

In case of land management, the community can better manage the land based on ownership incentives to the cultivators. In the Kano irrigation system of Nigeria, the land belongs to the government, irrigation water belongs to the government and infrastructure belongs to the government. However, cultivation right is given to the individual cultivators and the plot of land to be cultivated will keep on changing each year. So, the cultivators do not have any attachment to the irrigation system. They are concerned to get return out cultivation of that year. System got deteriorated. The channels were not desilted. Irrigation water can not reach the larger command area. Agriculture productivity also decreased. Providing land ownership to the cultivators is difficult but long term land lease can be arranged. Long term of 5 years land lease was given to the cultivators. This has brought tremendous change in land management and channel maintenance because they need to use the irrigation channel for next year as well. They agreed to have collective effort to clean the canal. Hence, sense of ownership in natural resource management bring positive results.
**Social Capital for Increasing Productivity of Community**

Social capital helps the community to revert back to normal community life. An example from the disaster (earthquake) and recovery of the community by letting them rebuild their irrigation systems is presented here.

Natural disasters like earthquake are also causes for rendering people in poverty trap. Appropriate strategy for rehabilitation of the important infrastructure in villages help pull villagers out from poverty trap. The following is a case of mobilizing villagers by using “their social capital” to rehabilitate their irrigation channel damaged by the Big earthquake visited in Nepal on 25 April 2015. This brought tremendous damages in the houses of the people rendering them homeless specially in 14 hill districts of Nepal. Communities and villages were destroyed by earthquake. It brought not only physical damages but also social and psychological uncertainty among the earthquake-affected people. As a temporary measure, tents, clothes and food were distributed by government, NGOs and foreign countries International non-governmental organization. However, these efforts of short-term support was appreciable but these activities made the community dependent on others in the long term.

The important question here is: How can they have long term food security? How can they have rebuilding of village and community infrastructure? Rebuilding of the community confidence was a big challenge and prevent them from poverty trap. April is the time that farmers need to get prepared for monsoon paddy cultivation in the villages of Nepal. Unfortunately, many irrigation systems got damaged by earthquake. Then, the question is: How can the community be revitalized and make them capable to rebuild their irrigation system? Let us analyze the community capacity based on 5 capitals for sustainable livelihood approach. This presentation aims to take the cases of Dhap village of Sindhupalchowk and Kalleritar village in Dhading district. In both cases (Dhap and Kalleritar) due to damage of physical capital, even the natural resource like water supply got disturbed in the farm lands of the villages. Both physical and natural capitals of these villages got damaged. This situation rendered villagers to be uncertain for long term food security. Due to damage of physical and natural capitals, financial capitals got disturbed for any further activities in the village. However, two resources like that of human (except a few deaths) and social capitals did not get directly destroyed. This presentation aims to look at the role of the human capital and social capital to bring back the jovial village and confidence among the villagers and prevent them for moving further towards poverty trap. In order to rebuild confidence of the villagers, support for long term food security is considered important. This is the time for preparation for paddy cultivation which gives them long term food security by cultivating paddy. The important input for timely paddy cultivation is the village irrigation systems in both villages. Discussed with the villagers, how can they rebuild the village irrigation systems (FMIS)? Can they do it by themselves? In both villages, farmers expressed that they can do by themselves provided some external financial resources are made available to them. They have been managing these systems by themselves for long period of time. On the basis of the discussion, Farmer Managed Irrigation System Promotion Trust (FMIST) made funds available to the farmers Water Users Association (WUA) for rehabilitation. Accountability and transparency were strictly
maintained. They took responsibility for rehabilitation. While doing this exercise, local leadership, local technology local materials, local skill were used. These resources are locally available. In short period of time, they made temporary rehabilitation and brought irrigation water in the farmer’s field. Once they made the water flow in the canal, other problem was the paddy seed. Whatever they were saving from last year got buried in the destroyed house debris. Paddy seeds were made available to them. The villagers decided themselves to have equitable distribution of externally made available seeds among the farmers of the affected area. Finally, they could cultivate the paddy field and harvested paddy which provided food security and confidence among the villagers.

By making use of existing social capital of the villagers and human capital and making them responsible to take decisions by themselves for their village could bring the functioning irrigation system back. Both villages could have food security for a year. It took the farmers about seven weeks to restore irrigation to about 60 percent of their farmland. One of village leaders commented that “we left the 40 percent of land as such because taking water to this area could trigger more landslides. But it doesn't mean this land is fallow. There we grow crops such as millet, which don't require (irrigation) water,” This shows that the community has the capacity to manage natural resources like irrigation system even under the stress of natural disaster like that of earthquake.

The important lessons are to learn from these case studies that the government has to take an active role in protecting the interest of the local community when new enterprises like plantation by the commercial companies or the development of hydropower ignoring the existing functioning irrigation systems, directly linked with the livelihood of the local people are promoted. Examples of cases about adverse impact on community and community people are found from Vietnam, Philippines and Indonesia in Natural Resources Management like in forestry and hydropower development. Government policy has to be specific to protect community and people from adverse impact (see cases from Philippines, Laos and Vietnam in www.PURDnet.wordpress.com).

**From Hardin to Ostrom**

In a period of three decades, many researches were undertaken to understand the nature of people and behavioral aspect of the community, many studies have shown that community behave properly in order to utilize the natural resources judiciously. It would not be free for all. Many cases have documented that the community would impose restriction to preserve the natural resources. They are shown control in the overgrazing of cattle and animals, or on benefit sharing of forest or use of water for agriculture.

Lin Ostrom contradicted Hardin’s pessimistic outlook in her classical work on Common Property Resource Management. She demonstrated the success of cooperative structures like the management of common land and natural resources (Ostrom. 1990). Her work on Common Property Resource Management has earned her Nobel Memorial Prize in Economic Science in 2009. The wealth of commons gained interest in the scientific community. Hardin’s work was criticized for its inaccuracy and failed to take into account to distinguish between common property and open resource access. Lin Ostrom proposed
that common property resources management can better be managed by the community. Her theory is based on “Economics of cooperation, not of competition” She advocates that neither state nor free market but by community alone can management common property resources (Ostrom. 1994).

**Take Home Message for Role of Community based Natural Resource Management.**

1. Overall legal framework is important to ensure the community based natural resources management. Positive presence of the government is important and its recognition lends legal status to the community.
2. Decentralization policy should have room for flexibility to accommodate local level diversity in maintenance and harvesting and utilization of the resources
3. The community brings out its rule and regulation for resource management. In other case, community in cooperation with government adopt government rules and regulations and administer in the community.
4. Sense of ownership of resources is important and benefit sharing has to be clearly defined
5. The community has to be self-regulating, self-governing and self-supporting and then it becomes vibrant community. In some cases, co-management is to be adopted.
6. The community forestry program adaptation in many Asian and Southeast Asian countries is the evidence that central control of these resources does not bring positive results.
7. Community based natural resources management is based on the principles of decentralization of community power.
8. There is need to encourage innovativeness and creativity in the community in order to encourage the accommodation of diversity of the community life.
9. Historical context of community capacity is to be understood in order to assess the capacity of the community.

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