



Review Article

Traditional Knowledge of Indigenous Communities of Rajasthan and Environment (A Short Review)

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ABSTRACT

Today, indigenous communities are facing a serious crisis of survival due to ecological imbalance and the deteriorating status of the environment. Modernization, changes in cultural, ethical and moral values, the devaluation of indigenous knowledge, lack of traditional practices, dislocation of tribal communities due to large scale development projects and derisory rehabilitation ways are some of the major factors that have altered and weakened both traditions of indigenous communities and nature. The need of the hour is to understand the traditions, knowledge and practices of India in general and tribal communities in particular for environmental conservation. The present paper explores the traditional knowledge of indigenous communities of India particularly Rajasthan in conservation and management of environment. Their storehouse of knowledge leads to many discoveries for modern pharmaceutical products, however patent laws are inadequate to protect traditional knowledge and biodiversity. The rights of tribal people can be defended by creating a community biodiversity register (CBR) of local products and their uses. Proper documentation of traditional tribal knowledge, conservation beliefs and values, environmentally acclimatize land use, natural resource management practices and defense could be supportive in environmental protection. For sustainable conservation of natural resources of the tribal area, there is a great necessity to sensitize the tribal communities about the plantation, afforestation, rainwater harvesting, use of bio-pesticides and bio-fertilizers along with proper sanitation.

KEYWORDS: Traditional knowledge, Tribes, Natural resources, Environment, Conservation.

INTRODUCTION

Pollution of the biosphere with toxic metals has accelerated significantly by industrial revolution (Swaminathan, 2003). Environmental pollution with heavy metals is belonged to human activities such as mining, smelting, electroplating, energy and fuel production, power transmission, intensive agriculture, sludge dumping and melting operations (Igwe and Abia, 2006). Heavy metals are mainly important due to their harmful effects on plants, especially those on vegetative and generative parts of the plants (Ekatarina and Jeliaskova, 2001). Traffic emissions on roads are the main cause of heavy metal accumulation in the surrounding environment and plant species (Scerbo et al., 2002). Recently, scientists have started to generate cost-effective technologies that include the use of biomass and live plants in the cleaning process of pollutants (Ebbs and Kochian, 1997; Dushenkov et al., 1997).

Several studies have been conducted to investigate the effects of different heavy metals concentrations of live plants (Gajewska et al., 2006; Pandey and Sharma, 2002).

Cu, Cr, Ni and Zn may be toxic to plants at high concentration (McLaughlin et al., 1999). The concentration causing toxicity varies with the type of ion, plant, and conditions of growth (Hirschi et al., 2000). In one research, the metal uptake capacity of the root of *Quercus ilex* L. (holly oak) for different metals was found to be in the order: Ni>Cd>Pb>Cu>Cr and leaf Ni>Cd>Cu>Pb>Cr. The highest amount adsorbed was Ni (root>leaf). Cr exhibited the least adsorption values for all the three types of phytomass compared to other metals (Prasad and Freitas, 2000). In another research, Kord and Kord (2011) showed that the highest and lowest metal concentrations were found in the heavy traffic and control sites, respectively. The industrial part of the city was characterized by high Zn, Cr and Ni contents. Oklo and Asemave (2013) reported

that the studied plants contain more of Fe and Pb, moderate amount of Zn, Co, Ni, and Cu and low concentration of Cd. Areas of higher population density appeared to have higher concentrations of the metals than the low population density area.

The aim of the present study was to determine the content of Ni, Cr and Cu in leaf and root of *Pinus eldarica* Medw., *Cupressus aruzonica*, *Platanus orientalis* and *Fraxinus excelsior* species under various polluted sites in Isfahan city and to investigate relations between contents of these metals. Tribal communities live with nature and they have developed livelihood approaches based on their indigenous knowledge. This knowledge was passed on through generations and it played a crucial role in the conservation of their surroundings. Tribes have indigenous knowledge about the medicinal values of plants, forecasting of climate, prediction of weather etc. Indigenous peoples' knowledge, conservation beliefs and values, environmentally adaptive and sensitive land use, resource management practices, and determined defence of territory and natural resources have enabled many of them to inhabit in the natural habitats for centuries without destroying their ecosystems and biodiversity (Sterens, 1997).

Today, tribal communities are facing a serious crisis of survival due to ecological imbalance and the deteriorating status of the environment. Modernization, changes in cultural, ethical and moral values, the devaluation of traditional tribal knowledge, lack of traditional practices, dislocation of tribal communities due to large scale development projects and derisory rehabilitation ways are some of the major factors that have altered and weakened both traditions of tribes and nature. The need of the hour is to understand the traditions, knowledge and practices of India in general and tribal communities in particular for environmental conservation.

The present paper explores the traditional knowledge of tribal communities of India chiefly Rajasthan in conservation and management of environment.

The environmental conditions have deteriorated and worsened all over the country due to a variety of aggravating factors. The overall situation is certainly a matter of grave concern, more specially because it is affecting adversely the quality of life of the people and eroding the very foundations of the national

economy and national security. The worst affected are the poorer sections of society. The situation is compounded by slack and inadequate enforcement of laws and legislations. In this scenario, the importance of strengthening the constitutional safeguards for environment protection and nature conservation cannot be underscored. There can be no doubt that it is only by ensuring ecological security that the goal of sustainable development and national well-being will become feasible.

Traditional knowledge in health and medicines

Traditional knowledge (TK) is largely oral and is the collective knowledge, beliefs and practices of indigenous people on sustainable use and management of resources. It embodies the wisdom developed over generations and encompasses agricultural knowledge, medicinal knowledge, biodiversity related knowledge and the like. Oft quoted classic examples of medicinal TK are: (i) Methi to bring down blood glucose; (ii) Composition of jamun, bitter gourd, jaggery and egg plant to treat diabetes; (iii) Kala jeera to treat hepatitis and asthma (Swamy, 2014). 'Nyshi' tribe of Arunachal has identified more than 60 indigenous plant species having medicinal and food value and treating lot of patients. He has also undertaken conservation of such plants through domestication and in last four to five years, he has expanded his local followers' network for developing and promoting herbal medicines (Singh and Srivastava, 2010).

Sharma and Kumar (2011) reviewed useful ethnobotanical information about the uses of plants by the tribal of Rajasthan. Most of plants having ethno botanic use have been categorized into rare and endangered. This lack of effort to sustain resources may result in their depletion from natural habitats. There is a great need to create awareness among the indigenous communities about endangering medicinal plants, if over exploited to meet market demand.

Proper documentation of indigenous tribal knowledge about the plants could be supportive in achievement of objectives. Local cultivation of medicinal plants and other economic species can play an important role in economic development of the area. For

sustainable and long term conservation of natural resources of the area; there is a need to actively involve the quiescence of local people in evaluation, planning, implementation and monitoring processes as they are the best judges of the area (Sharma and Kumar, 2011).

Traditional knowledge in food and fibre

Traditional Knowledge is a key element of the social capital to produce food, to provide shelter or to achieve success in their lives. TK also helps shape local visions and perceptions of environment and society. This mainly includes: (i) Local healing practices; (ii) Communal use of land and forest; (iii) Agroforestry practices; (iv) Agriculture; (v) Animal husbandry; (vi) Use and management of natural resources; (vii) Construction of houses using natural materials; (viii) Water collecting mechanisms; (ix) Midwives; (x) Herbal medicines; (xi) Transfer of knowledge through elders, rituals or folk songs (Swamy, 2014).

Traditional knowledge and conservation

Since local knowledge systems in India are still being practiced among the masses, they can contribute to address the challenges of forest management (Pandey, 1998), sustainable water management (Pandey, 2001), biodiversity conservation (Pandey, 2002), and mitigation of global climate change (Magistro and Roncoli, 2001; Pandey, 2002). Ecological consequences of climate change (McCarty, 2001; Pandey, 2002; Walther *et al.*, 2002) require that we access all stocks of knowledge for mitigation strategies.

Local knowledge has proved useful for forest restoration and protected area management in Rajasthan – one of the driest regions of India with scanty rainfall. Cultural landscapes in rural and urban areas and agroecosystems, created by the application of scientific and local knowledge, also support a variety trees, birds and other species, and provide opportunity of integration of nature and society (Taylor, 2002).

Moreover, with the commercialisation of even natural resources, traditional knowledge that managed to maintain sustainable levels of harvest has been sidelined. Issues of privatisation, alienation and 'bio-piracy' are major areas of concern. With globalisation these pressures are stronger than ever. The existing policy and legal mechanisms to

protect traditional knowledge usually does not involve these communities themselves.

A participatory Knowledge Management System is evolving which fosters understanding of genetics, trade and legal issues. Intellectual property rights of the tribal communities are protected under the provisions of the Protection of Plant Varieties and Farmers' Rights Act and Biodiversity Act (2002) (Swain, 2010).

Research on traditional knowledge in Rajasthan

Application of scientific research and local knowledge contributes both to the equity, opportunity, security and empowerment of local communities, as well as to the sustainability of the natural resources. Local knowledge helps in scenario analysis, data collection, management planning, designing of the adaptive strategies to learn and get feedback, and institutional support to put policies in to practice (Getz *et al.*, 1999). Science, on the other hand, provides new technologies, or helps in improvement to the existing ones. It also provides tools for networking, storing, visualizing, and analyzing information, as well as projecting long-term trends so that efficient solutions to complex problems can be obtained (Pandey, 2002).

Local knowledge systems have been found to contribute to sustainability in diverse fields such as biodiversity conservation and maintenance of ecosystems services, tropical ecological and biocultural restoration, sustainable water management, genetic resource conservation and management of other natural resources. Local knowledge has also been found useful for ecosystem restoration and often has ingredients of adaptive management.

There are 15 types of resource management practices that result in biodiversity conservation and contribute to landscape heterogeneity in arid ecosystems of Rajasthan. Environmental ethics of Bisnoi community suggest compassion to wildlife, and forbid felling of *Prosopis cineraria* trees found in the region. Bisnoi teachings proclaim: "If one has to lose head (life) for saving a tree, know that the bargain is inexpensive" (Pandey, 2002).

Conservation and management of sacred grove

Traditional and indigenous communities in India are of the religious belief that medicinal

groves and plants are sacred in nature. Sacred groves (SGs) are patches of trees on forest land that are protected communally with religious zeal and connotations. These forest areas have been protected since ages by traditional societies and indigenous communities with their socio-cultural and religious practices. Sacred groves as a rule are treated piously (Kandari et al., 2014). Sacred grove portrays a fine example for community based nature conservation without any extra mural support. The current resurgence of interest in the system is mostly due to its invaluable contribution towards conservation of biodiversity and important ecosystem services. Conservation activities are mainly of three types a) strengthening the existing conservation activities of the villagers and b) restoration of the degraded sacred groves and c) landscape level approaches (Ray et al., 2010). However, the need of the hour is to aware people about its importance, involve people in its conservation and management and exploring its potential in livelihood improvement (Ray et al., 2010).

Conservation and management of sacred cliff

Cliffs in Udaipur and Kota districts of Rajasthan were surveyed (7 cliff with ancient vegetation). Cliffs were found to have more than 25 species of trees, several species of shrubs and herbs. All the 7 cliffs surveyed in Rajasthan are sacred. They are often part of the sacred corridors along the riverbank escarpment with several meters of precipitous fall. Attempts have been made to regenerate the Gaipernath Cliff with the traditional species occurring in the area (*Lannea coromandelica*, *Boswellia serrata*, *Sterculia urens* etc. about 25 species). The result was very poor initially. But local ethnobotany techniques of tucking the branch cuttings of coppicing species in whatever little crevices area may have were successful. Also, depositing the seeds (same species that occur) in crevices with the ball of moist earth has been found promising.

Conservation and management of soil

The traditional practices appeared viable, relevant, and time tested in conserving soil for sustainable crop production in this study. The traditional practices of soil conservation and management are environment friendly and hence the community must be encouraged to

continue such practices in view of the ongoing consequences of climate change. Besides, the traditional wisdom should be documented in view of its importance in developing environment-friendly models for resource augmentation and sustainable management (Kala, 2013). Plantation will help in soil conservation as well as retaining the moisture of the soil. Harvesting rainy water at appropriate location by construction of water harvesting structure can help the people. Environmental protection can change the present problem of erratic and untimely rainfall. Awareness generation among the tribal women can be very helpful in development of environment in the surrounding area of each village. This will help in security from pollution related diseases and keep the people healthy. The agriculture residue, domestic waste and cattle dung can be used for preparation of bio fertilizers helpful for using in cultivated fields and horticulture activity. Training for preparation of bio-fertilizers and bio-pesticides with the use of local material can retain the natural fertility of the soil and will protect people from health hazard caused by chemical fertilizers and pesticides.

Forest regeneration

Forest regeneration is very much essential for survival of tribal community as they have long association with the forests. In the changing scenario, environment protection is most important aspect for survival of the human beings, wild life and ecology of the earth. Understanding of traditional knowledge on biodiversity of the region will be most helpful in planning for sustainable forest management. If some support is provided to tribal people in selection of appropriate variety of fruit plantation, providing them sappling, training and preparation of vegetative barriers, it can be an innovative effort and can revive the old days of tribal prosperity. In addition to plantation, tribal people can collect medicinal produce grown in the area, honey preparation and processing as well as assured conservation of ecological balance. Jadav payeng in Assam transformed a barren sandbar into a lush forest thriving with wildlife (Bhattacharya, 2013).

Water Harvesting and Conservation

Revival of local rainwater harvesting globally could provide substantial amounts of water for nature and society. For example, a hectare of

land in Jaisalmer, one of India's driest places with 100 mm of rainfall per year, could yield 1 million liters of water from harvesting rainwater. Even with the simple technology such as ponds and earthen embankments called tanks, at least half a million liters a year can be harvested from rain falling over one hectare of land, as is being done in the Thar desert, making it the most densely populated desert in the world. Indeed, there are 1.5 million village tanks in use and sustaining everyday life in the 660,000 villages in India (Pandey, 2001).

In Rajasthan, tanks and ponds have been a mainstay of rural communities for centuries. Strategies for tank rehabilitation (such as proposed for 1200 large tanks in Rajasthan) must not treat tanks only as flow irrigation systems; such an approach is very likely to result in a flawed strategy. A strategy that considers tanks as multiple-use socio-ecological entities, and which recognizes multiple stakeholder groups is more likely to enhance the social value of tanks (Shah and Raju, 2002).

Collective wisdom of humanity for conservation of biodiversity, embodied both in formal science as well as local systems of knowledge, therefore, is the key to pursue our progress towards sustainability.

Indigenous knowledge of the tribal communities in forecasting climate

Some of the predictions in climate using indigenous knowledge are mentioned as:

Ficus species: Flowering and generation of new leaves indicates near rainfall onset.

Butterfly: Appearance of many butterflies indicate early rainfall onset and also gives a prospect of good season.

Ants: Appearance of ants indicate imminent rainfall onset and signifies a prospect for good season.

Termites: Appearance of many termites indicates near rainfall onset.

Frogs: When frogs start to make a lot noise, it indicates near rainfall onset.

Change in wind direction and temperature (Signifies imminent rainfall)

The tribal assess the probability of early warning of flood extent by observing colour of clouds, their location, intensity and frequency of rainfall. The unusual sounds and changes in water flow, colour of water, direction of wind and the unusual behavior of wildlife like ants, birds, rats and Snakes also helps in the assessment of climatic variations.

The tribal of Rajasthan also have faith in the sayings of elders about the prediction of weather, for e.g. “*Sukarvar ri badri,rahi shanichar jaye,barsa bina na jaya*”. It means that if clouds form on Friday and remain till Saturday then they will not go without rain, such indications predict rains. In another saying “*Nada tankan,balad bikavan.mat baje tu,adhe saawan*”. It means that in mid monsoon if South-East wind blow then farmer of marwar region cries because it indicates famine in the particular region. Similarly “*Pawan baje Suryo,to hali halav kim puryo*” means that if winds flow in the North-West direction then farmer should not plough his field because it indicates heavy rains. (Pareek and Trivedi, 2011).

Pareek and Trivedi (2011) documented tribal communities (including *Bhil, Meena, Banjara, Kathodi, Rabaris, Sansi* and *Kanjar*) observation and management of natural disasters and extreme weather events, including their strategies for early detection of coming events and for coping with these events, as well as their perceptions of their short and long term impacts on biodiversity.

Changing lifestyle and traditional knowledge

The Inter-governmental committee of WIPO has identified specific threats to TK including: (a) Unauthorised commercial exploitation; (b) Insulting, degrading or culturally offensive use of material that is the subject matter of TK; (c) False or misleading indications that there is a relationship with the communities wherein the material has originated; (d) Failure to appropriately acknowledge the source of the material (Overview of the Activities and Outcomes of the Committee, Intergovernmental Committee, WIPO/GRTKF/IC/5/12-2003pp20-21).

Needless to say, there are four primary reasons as to why TK should be protected: (a) Conserving the environment; (b) Improving the livelihood of TK holders; (c) Benefiting national economies in a knowledge driven era; and (d) Preventing biopiracy (Swamy, 2014).

Tribal people do not fell a green tree and collect fuel wood of dead trees and bushes. Even tree plantation is possible in rocky hills and once the trees survive, the tribal people protect those and even fill the dead plants

through replantation. Environment of the tribal area can be protected and developed with the proposed manner. Some wild plants also grow in the waste land possessing medicinal values, which can also be collected by the tribal. Since women plays vital role in the activities, they can certainly adopt this practice and upkeep their trees.

Intellectual property rights (IPR) and patent issues

The linkage between IPRs, biodiversity and traditional knowledge (TK) is of recent origin. Traditional Knowledge on the other hand is the result of intellectual activity in a traditional context. It is intricately woven into the living styles and practices of communities. This knowledge is transmitted through songs, stories, rituals and legends (Swamy, 2014).

Intellectual Property Right offers two forms of protection to TK: (i) A positive protection by granting exclusive rights over use to the members of the local community, and (ii) a negative protection by excluding others from the use of TK held by a particular community (Swamy, 2014).

There is need for synergy between locals and scientists. Modern science can give a broader perspective to local sustainability whereas traditional knowledge can provide in depth experience in the local context. Indigenous people should be fully involved in every stage of policies and plans related to sustainable development.

This requires political will, education, and a change in the mindset of the people at large.

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Conservation of natural resources and culture can be achieved only through the empowerment of indigenous communities and their development. Finally, it is good to know that our efforts at preservation of natural resources have been recognised the world over with the latest survey by National Geographic magazine calling Indians as the most environment-friendly people. But this puts an additional responsibility on Indians, that is, not only to protect, preserve and promote Indian cultural heritage and traditional knowledge, but also to lead the world in environment conservation through sustainable development through the ages (Chhibber, 2008). Borang (2001) feels that younger generation should be given opportunity in schools also to master the traditional culture and ecological knowledge of their elders.

CONCLUSION

Tribal people are ardent observers of their natural environment. Their cultural traditions have significance for conservation of environment as their knowledge is a key source of information and insight in areas such as traditional medicine, agroforestry, biodiversity conservation, customary resource management, natural disaster preparedness and response, and impact assessment. Government should absorb them in policy decision making process. Government should take initiatives to incorporate traditional knowledge with scientific facts and inculcates traditional knowledge to the younger generations. This new knowledge base will contribute in conservation of environment.

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