

1. Origin of the Research Problem:

There are many examples that illustrate the resourcefulness of indigenous people in applying traditional knowledge to lessen the impacts of disasters. Some use strips of mangrove forest to absorb the force of tidal surges and tsunamis, others apply genetic diversity in crops to avoid total crop failure, and some communities move between habitats as hazards strike. Strategies for early warning include observations of conditions and events that are warning signs. The most common are related to animal behavior and the appearance of the sky. Indigenous peoples continue to apply traditional knowledge on early warning and strategies for mitigation of the negative consequences of disasters. Again, the challenge lies with transferring traditional knowledge between generations. The indigenous knowledge that is passed from generation to generation helps them to minimize risk, cope with natural dangers and learn how to survive apart from creating socio-economic sustenance. Social scientists observe that these are no longer naïve views of nature. Superstitions, myths, and local knowledge are still grounded in people's core beliefs. Scientists who use the latest technology can bridge the gap between the people who stand to benefit from their work. However, they must not underestimate the indigenous capabilities that the people possess and should understand how their work will be received by people who intimately experience and cope with natural disasters and create a sustainable development environment. Thus, it would be desirable to combine modern knowledge and indigenous knowledge in disaster preparedness and mitigation with the goal of building community capacity in a participatory, sustainable and cost-effective manner. The study would aim to encourage policymakers to incorporate a diverse range of indigenous knowledge in the disaster management and sustainable development initiatives of the country.

In the above context, systematic and in-depth studies on eco community's indigenous knowledge capacity building for disaster risk reduction and management are rare in India. Indigenous knowledge, as such, is not well documented and is in danger of being lost as its custodians pass away. It is crucial to preserve this valuable body of knowledge and integrate it into modern disaster risk reduction efforts. The inclusion of indigenous people into discussions of climate change and risk reduction cannot be ignored. Lack of organized study in this area has led to vulnerability of communities and the nation as a whole in coping with natural disasters. Several studies are available on the value of indigenous knowledge for natural resource management in Africa and Asia-Pacific countries. However, literature on indigenous knowledge for disaster mitigation and preparedness is scattered and very scarce. Systematic and in-depth studies on disaster mitigation in general and indigenous knowledge in particular would be very useful in this regard.

Thus, the proposed research work aims to fulfill this need. Moreover, people in the disaster prone area have been coping with natural calamities by their own traditional techniques. Often, they face the problems taking different adaptation mechanisms. The coping mechanisms, they adopt, have been originated by their family and community wisdoms, which we can consider as indigenous knowledge. However, as intensity of climatic disasters increased, depletion of knowledge among new generation (as the new generations are ignorant about indigenous knowledge) and occupational migration - this indigenous knowledge base is depleting. Policy documents are lacking to fully address the indigenous knowledge of natural resource dependent people of the coastal area. There are no priority areas to document indigenous knowledge, which are important in the formulation of

adaptation and mitigation strategies specific for the location. The policy documents produced by the government do not also consider proper participation of environment dependent occupational groups. Thus, it grossly fails to ensure community level participation in the knowledge capital formation process in order to cope up with natural disasters. Local /Indigenous knowledge is a powerful asset and social capital which is vulnerable to climate change. Policies and programs incorporating such knowledge are more likely to be acceptable and successful in the long run by judiciously prioritizing on community needs, problems, aspirations and local ecology specific.

2.1 Deliverables of the Proposed Research Work

In this project, special attention would be given to the development and preservation of indigenous knowledge systems (i.e. indigenous knowledge documentation and database) and its causal relationship to disaster risk reduction and environmental sustainability. A conscious effort would also be made to ensure participation of local inhabitants for long-term acceptance and success of this project. It can be noted that when documented, the information would be available in a convenient form to a wide range of audiences including government decision makers, environmental and disaster management practitioners, medical practitioners, academics, researchers, journalists, indigenous and local communities, as well as international development agents including UNEP and other stakeholders. The study intends to strengthen capacity building in indigenous knowledge and help to integrate the knowledge with other knowledge systems and development processes, particularly for environmental conservation and natural disaster management. Towards this goal, it would facilitate community engagement and link teaching; research and practice to better reflect the knowledge creation and knowledge mobilization across the eco communities and academic/research institutions. This would offer a vital opportunity to address the issues of community health, community cultures, community practices in sustainable development/natural resources and other related aspects of community knowledge production, application and dissemination.



2.2. Interdisciplinary Relevance

Any holistic work on Indigenous knowledge, Disaster mitigation or Eco village and their mutually adjoining line of research would invariably require a facilitating interface between both formal and local methods, as well as local people and formally trained scientists, which shall contribute to comprehend the data, information and knowledge. In collaborative efforts of such kind, everyone involved may stand to benefit. Both local people as well as external experts need access to the latest scientific developments to see if it can help improve existing conservation knowledge and practices. The policy makers need ready access to the science as well as understanding the difficulties of its application (1. Kohm *et al.* 2000). Indeed, there are numerous examples where local knowledge derived from long-term nature-society interaction has been extremely useful in validating scientific hypotheses and suggesting new research directions (2. Kimmerer 2002, 3. Robertson and Hull 2001).

Interestingly, Intellectual Property Rights are now also being extended to beyond the conventional domain of mechanical and chemical innovations to include biological and environmental resources. National Biological Diversity Act of India in response to the commitment to the Convention on Biological Diversity and intellectual property rights is also being contemplated to devise operational mechanisms to share benefits of commercial applications of traditional knowledge on biodiversity with local communities. Also useful shall be to ensure a harmonized basket of rules made under the Patent Act, Protected Plant Varieties Act, and the Biological Diversity Act (4. Utkarsh *et al.* 1999).

Therefore, apart from creating and transmitting scientific knowledge to policy makers and practitioners, through such interdisciplinary and holistic study, scientific community would also be sensitized to collaborate with people to put forth new hypotheses that incorporate aspirations of formal and local systems of knowing and modify their methodologies accordingly. Humanity needs to go beyond disciplinary divide and find a common ground across cultures, faiths and disciplines (5. Pandey, 2002a). Collective wisdom of humanity for conservation of biodiversity embodied both in formal science as well as in local systems of knowledge, therefore, is the key to pursue our progress towards sustainability.

For the academia, however, this type of community based research projects can become an intrinsic part of learning and teaching. It would facilitate partnerships between eco communities and institutions of higher education so that students and teachers can learn from indigenous knowledge and wisdom, thereby democratizing knowledge production. The proposed study intends to create an '*interface structure*' acting as a communicator, mediator and coordinator of institutional linkages and partnerships with the communities and their indigenous knowledge capital. As an innovative application of data surveys, it is also proposed to ensure eco-community engagement with the assistance of UG and PG students of Management course undergoing internships or course -work. It would provide them much needed opportunity of rural/eco community exposure and sensitization, while also serving the mutually agreed interests of both local communities and the institution.

Reference:

1. Kohm, K., Boersma, P.D, Meffe, G.K., Noss, R. 2000. Putting the science into practice and the practice into science. *Conservation Biology* 14: 593-594.

2. Kimmerer, R. W. (2002). Weaving traditional ecological knowledge into biological education: A call to action. *BioScience* 52: 432-438.
3. Robertson, D. P., and R. B. Hull. (2001). Beyond biology: toward a more public ecology for conservation. *Conservation Biology* 15: 970-979.
4. Utkarsh, G., Gadgil, M., and Rao, P.R.S. 1999. Intellectual property rights on biological resources: Benefiting from biodiversity and people's knowledge. *Current Science* 77: 1418-1425. *The Geographical Review*, 92(2): 282-306
5. Pandey, D.N. (2002a). Cultural resources for conservation science. *Conservation Biology* (in press).

2. Review of Research and Development in the subject:

3.1 International Status

The United Nations Environment Programme (UNEP) recognizes the role of indigenous knowledge in the conservation of natural resources and management of natural disasters. The UN Conference on Environment and Development (UNCED) in 1992 specifically highlighted an urgent need for developing mechanisms to protect the earth's biological diversity through local knowledge. Many documents signed at UNCED reflected the need to conserve the knowledge of the environment that is being lost in communities. Similarly, the World Conference on Science in Budapest in 1999 recommended that scientific and traditional knowledge be integrated in interdisciplinary projects dealing with links between culture, environment and development in areas such as the conservation of biological diversity, management of natural resources, understanding of natural hazards and mitigation of their impact.

Globally, the hazard perception studies show that natural hazards are non-linear and complex events shaped by and resulting from the combination of not only geophysical and meteorological factors but also (and mainly) political, economic, socio-cultural, and psychological (or perceptual) phenomena and factors. Together they make an integral mechanism of communication and exchange of Information, resources and activities between any country's own national or domestic natural system and global or inter-national natural systems (Figure 2). The social dimension of risks and hazards is important because local communities see them through a cultural lens; and this is dependent upon their view of the cosmos and accumulated experience (1. Linkenbach-Fuchs 2002).

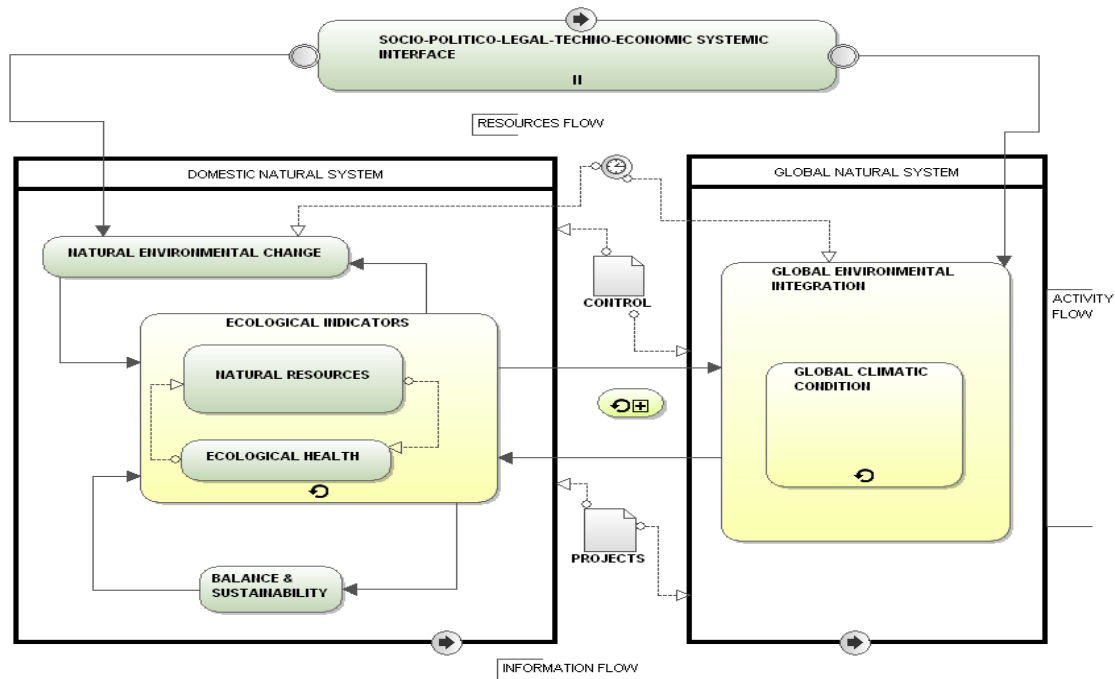


Figure 2: Dynamic Interface between Domestic and Global Natural Systems

In the 1960s and 1970s, geographers and meteorologists studied the impacts of natural disasters on people mainly from a technical perspective. The dominant approach to natural hazards and disasters focused on hazards as physical events requiring scientific and technical solutions. Natural hazards were understood in the context of simplistic determinism (where physical processes determine human actions) and linear causal relationships from geophysical events to impacts to human responses. People were assumed to live in vulnerable conditions due to a lack of knowledge (Schilderman 2004). In the 1980s and 1990s, researchers in the field of natural hazards and disasters began to criticize the deterministic, a historical and asocial concept of hazards and disasters and its dependence upon the use of choice and decision models (2. Hewitt 1983; 3. Gardner 2002). Though, as an exception, from the early 1970s on, the Man and the Biosphere (MAB) Program has contributed to work on traditional ecological knowledge, through a series of field studies on local and indigenous peoples and their decision-making and resource-management systems.

Lately, the growing focus of research and development in the area of indigenous knowledge has been the need to take the human dimensions of natural hazards into account (including local knowledge, practices, and perceptions) in disaster management (4. Anderson and Woodrow 1989; 5. Johnson et al. 1982 in a case study documenting local knowledge of landslide hazards in the Kakani- Kathmandu area, Nepal). In fact, the studies on hazard perception emerged in the US from Gilbert White's group at Chicago in the 1960s. This work initially focused on wheat farmers' perceptions of and responses to

droughts in the Great Plains of North America (6. Saarinen 1969). However, a lot of this work degenerated into standardized questionnaire surveys and 'official' analyses applied in developing countries (2. Ken Hewitt).

In 1992, The Convention on biological diversity required that every contracting party should respect, preserve and maintain knowledge, innovations and practices of traditional and local communities and promote the wider application with the approval and involvement of the holder of such knowledge, innovations and practices and encourage the equitable sharing of the benefits. As nations implement the Convention on Biological Diversity (CBD) work programs, apply its guidelines, and execute national strategies, its influence on science is likely to grow. CBD-compliant national laws and policies already set priorities for research and affect the way in which scientists can access and use genetic resources (7. Kate, 2002).

The United Nations also recognized the disastrous impacts of natural hazards on vulnerable communities and, by the year 2000, all countries were encouraged to have comprehensive national assessments of natural hazards and risks integrated into national development plans and to address long-term disaster prevention, preparedness, and community awareness in mitigation plans. In reality, funds dropped – mainly because of the Gulf War (1991) and a series of natural disasters in developed nations, including the Kobe earthquake. The Kobe earthquake demonstrated that developed nations could not prevent disaster and that relief aid was inappropriate. In 1994, the United Nations World Conference on Natural Disaster Reduction in Yokohama called for paying more attention than before to traditional knowledge and community based actions. The Kobe earthquake also led to a switch from a technocratic view of natural hazards to a focus on vulnerability.

It has also been acknowledged that by appreciating and making use of peoples' knowledge we shall also promote the principle of equity of knowledge (8. Pandey, 1998). Equity of knowledge between local and formal sciences results in empowerment, security and opportunity for local people. If the state and formal institutions incorporate people's knowledge into the resource management decisions, it reduces the social barriers to participation and enhances the capacity of the local people to make choices to solve the problem. Equity of knowledge can also enhance the economic, environmental and social security in its broadest sense. By capitalizing on the collective wisdom of formal and traditional sciences, we shall be able to help people address the problem of global warming as well as to manage the risks they face because of the destruction of the local resources. Equity of knowledge also provides opportunity for local people to participate in the management of local affairs with global implications. It also provides the opportunity for self-determination. Human ecological perspective is vital in creating the sustainability science for natural resource management.

Thus in conclusion, the UN has specifically, triggered indigenous knowledge (IK) consideration in several publications. For example, Priority 3 of the Hyogo Framework for Action 2005-2015 that focuses on education and knowledge, considers IK as a means of building a culture of safety and resilience. It designates one of its key activities to the importance of information management and exchange, and highlights the use of "relevant traditional and indigenous knowledge and cultural heritage" to be shared with and adapted to different target audiences. UNEP has done much work

with African and Asia-Pacific local communities who also have well-developed traditional indigenous knowledge systems. This is the potential wealth of knowledge available to world from its indigenous peoples, which is why this international day is a fitting tribute to those who can bequeath us with the wisdom and experience of the ancestors as a guide for the future. Such knowledge for assessing risk is fundamental to saving tens of thousands of lives and building resilience in communities.

3.1.1. A Case Reference of Africa and Asia-Pacific

Taking reference of Africa, local communities had well-developed traditional knowledge system for environmental management and coping strategies, making them more resilient to environmental change. This knowledge had, and still has, a high degree of acceptability amongst the majority of populations in which it has been preserved. Specifically, from time immemorial, natural disaster management in Africa has been deeply rooted in local communities, which apply and use indigenous knowledge to master and monitor climate and other natural systems and establish early warning indicators for their own benefit and future generations. These communities can easily identify with this knowledge and it facilitates their understanding of certain modern scientific concepts for environmental management, including disaster prevention, preparedness, response and mitigation. For example, the application and use of indigenous knowledge for disaster management is prevalent in Swaziland. Floods can be predicted from the height of birds' nests near rivers. Moth numbers can predict drought. The position of the sun and the cry of a specific bird on trees near rivers may predict onset of the rainy season for farming. On the other side, contrastingly, many of the Asia-Pacific communities have been given little attention by other disaster planning mechanisms and have employed their knowledge as a way to help themselves in difficult times. Much of the knowledge embedded in these communities has been dismissed by outsiders as inferior and often ignored as belonging to "backward" and "less-educated" people. Yet many of these communities have developed successful lessons and strategies for managing recurring disasters and surviving extreme events, which even high tech instruments, are unable to help. All of these communities share a common ability to depend on themselves during disasters and a similar understanding of local threats and how to reduce these risks. Therefore, there are many lessons to be learned from these communities.

3.2 National Status

In the past, some studies have been done on Bio cultural diversity, climate change and livelihood security of Adivasi community particularly in Arunachal Pradesh. These studies were based on the collaborative work with Adi tribes from 14 villages of East and Upper Siang districts of Arunachal Pradesh, and aimed at recording Adi knowledge and experiences related to biocultural resources and their interactions with climate change and livelihood sustainability. The findings revealed that the Adi tribes have a rich knowledge related to biocultural resources, which plays an important role for the tribes in coping with weather anomalies and any abrupt climatic changes in order to sustain their livelihoods. It also emphasizes that the future of the Adi tribes' biocultural resources and livelihood sustainability depends very much on their Traditional Environmental Knowledge (TEK) and their active role in research, planning and policy implementation for climate change mitigation and adaptation. In addition to it, certain research papers have reviewed the concepts and associated ecological hypothesis that India has a treasure of indigenous and traditional knowledge of natural resource

management and these can be extrapolated to understand the modern concepts of disaster risk management in terms of early warning, preparedness, mitigation, response and relief as well.

Some preliminary researches also discuss this in the context of cases from Rajasthan and Bundelkhand in order to evolve recommendations for science and policies. They argue that revitalization of traditional knowledge should not be considered as strictly implementing more and more sets of simple techniques, but should be viewed as an integrative means to be evaluated in the framework of environmental, productive and cultural conditions of societies. Local people are custodians of traditional systems and are well informed of their resources, what works and does not work.

Very recently, under the auspices of Centre for Equity Studies, New Delhi, a policy note of sub-committee on Community Engagement in Higher Education has been prepared. The policy note highlights the relevance and necessity of community engagement at national level with the institutions of higher studies and research. This calls for community-institutional partnerships promoting research projects, which are need, based and community oriented leading to policy formulation for sustainable ecological and societal development to achieve the broader goal of national development under the 12th plan. According to this initiative, specific villages and communities can be adopted for providing engagement opportunities to academia from various disciplines and courses to integrate their knowledge with the community based indigenous knowledge. It would then be able to address the challenges of the specific community as well as the broader environmental challenges that the humanity is confronted with.

In conclusion, it can thus be argued that systematic integration of cultural heritage and traditional technology, skills and local knowledge systems within the environment and development as effective means of reducing impact of disasters into existing sustainable development goals and policies at international national and local levels are central needs for developing capacities.

Reference:

1. Linkenback-Fuchs, A. (2002) **Cultural Strategies for Risk Adjustments in Mountains**. Paper presented at the Asia High Summit 2002, May 6-10. Kathmandu, Nepal
2. Hewitt, K. (ed) (1983) **Interpretations of Calamity from the Viewpoint of Human Ecology, The Risks and Hazards Series: 1**. New York: Allen and Unwin
3. Gardner, J. (2002) 'Natural Hazards Risk in the Kullu District, Himachal Pradesh, India'. In
4. Anderson, M.B.; Woodrow, P.J. (1989) **Rising from the Ashes: Development Strategies in Times of Disasters**. Boulder: Westview
5. Johnson, K.; Olson, E.A.; Manandhar, S. (1982) 'Environmental Knowledge and Response to Natural Hazards in Mountainous Nepal'. In *Mountain Research and Development*, 2(2): 175-188
6. Saarinen, T.F. (1969) **Perception of the Drought Hazard on the Great Plains**. Chicago: University of Chicago Press
7. Kate, K.t. (2002). **Science and the Convention on Biological Diversity**. *Science* 295: 2371-2372.
8. Pandey, D.N. (1998). **Ethnoforestry: Local Knowledge for Sustainable Forestry and Livelihood Security**. Himanshu/AFN, New Delhi.

3. Significance of the Study

Environmental conservation and disaster management are critical to the livelihoods of indigenous people who often live in hazard-prone areas. They have built up, through thousands of years of experience and intimate contact with the environment, a vast body of knowledge on hazards and the environment events. This knowledge is a precious resource that continues to contribute to environmental conservation and disaster management in these regions. With the disruption of traditional lifestyles and changing settlement patterns, it is a challenge to maintain the continuity of traditional knowledge through transmission from generation to generation. In this way, Indigenous knowledge should be considered as a complement to scientific knowledge in the development of community based disaster mitigation and risk management plans and programs.

Hence, it can be said that dynamic mechanisms for disaster risk reduction usually demonstrate strong ownership and leadership of knowledge driven risk reduction activities. Not only should indigenous knowledge management be fully integrated into disaster mitigation at the community level, but such programs should also become pillars of efforts to develop broader national knowledge systems for disaster risk reduction and sustainable community development. An active communion and collaboration is primarily required among various sectors like Political, Social, Economic and Technological. Moreover, it must include environmental and disaster institutions and managers (including Corporate) more closely in the indigenous knowledge acquisition processes that would potentially reduce disaster events (Figure 3) through a thorough review and enrichment of their eco-foot print, programs and environmental resources. Despite the knowledge acquisition implications of disaster risk and vulnerability, and the long-term consequences for sustainable development, the role of environmental managers in disaster reduction, response or recovery has always remained ad-hoc.

Indigenous and local eco village communities have a stockpile of knowledge about their flora and fauna - their habits, habitats, and seasonal behavior. It is therefore only logical and in consonance with natural justice, that they are given a greater say in matters regarding the study, extraction and commercialization of indigenous knowledge. In summary, it is important to note that we need to legitimize and validate indigenous knowledge for sustainable development on its own terms, and also recognize that it becomes crucial in the development of eco village communities and that the skills and cultures of indigenous people need to be harnessed for the good of all of us. Furthermore, we need to create conditions in which the capacity building in indigenous knowledge may also assist in shaping broader policy framework and encourage benefit sharing for indigenous innovation. In addition, there is a need for thorough research to provide basic direction, particularly in India, that will allow for the success in the indigenous knowledge acquisition process and transform the mindset of academic and administrative community with regard to indigenous knowledge and other forms of knowledge in general.

4. OBJECTIVES OF RESEARCH:

1. To analyze the macro socio-economic-environmental interface in the selected eco-communities of India
2. To examine the facets of indigenous knowledge capacity and its dissemination in the selected eco community villages of India
3. To explore the prospect of indigenous knowledge capacity building under a holistic 'Stakeholder' framework
4. To evaluate the nature and scale of cross-community information sharing and capacity building for disaster mitigation and sustainable development in the selected regions
5. To develop causal system model based on the linkages amongst critical decision variables related to indigenous capacity building and value enrichment
6. To devise policy guidelines and action plans of large scale acquisition and dissemination of indigenous knowledge capacity of eco communities across India

The underlying theme of this research will be to nurture an environment where eco community villages see value and are willing and able to participate in the very activities and purposes of the undertaken research.

5. RESEARCH DESIGN AND METHODOLOGY

In this kind of holistic study, in addition to extensive review of the relevant literature available on indigenous knowledge, a multiple set of data collection methods, need to be used in the selected eco village community based on interactive discussions, open interviews, focus group discussions, meetings, cultural mapping and interactive sessions with rural folk. In particular, meetings are deemed important for informing and building community trust with the researchers and laying the groundwork for further research.

It is thus a promotion of participatory research methodology where research is with communities, and not just 'for' them. This would ensure accountability of research process and outcomes to a wider community.

6.1 Data Collection Approach

Both primary and secondary data has been collected and analyzed. Attempts has been made to develop an appropriate checklist of common indigenous knowledge terminology used in environmental resources conservation and natural disaster management. Further, in collecting data, an attempt will be made to ensure that there is a clear understanding of the linkages between application and use of indigenous knowledge and cultural and spiritual values, which permeate many of the communities under study.

6.2 Sources of Data:

6.2.1. Primary Data

A range of tools has been used to collect the required information. The following is a break-up of the proposed data collection methodology

- 1) Field Scan (Pilot Study) to interact with the local stakeholders relevant to map the socio-economic-environmental profile of identified eco clusters in India.
- 2) Socio-economic-environmental surveys and cultural mapping based on case-studies, Schedules and observation

6.2.2. Secondary Data

It is proposed to gather information from a range of institutions such as Govt. agencies, NGOs, private agencies while doing documentary search through newspapers, journals, trade magazines, environment Reports, web-sites etc.

6.2.3. Geographical Area under Study (Hub-Locations):

District/State	Proposed Project location	Secondary data collected	Primary data Collected
Agra (UP)	Dayalbagh	✓	✓
Harda (MP)	Rajaborari	✓	✓
Buxar (Bihar)	Murar	✓	✓
Rajasthan	Udaipur	✓	–
Uttarakhand	Roorkee	✓	✓