

**Report of**  
**The Field Study of Impacts of**  
**Urban-Industrial Development on**  
**Natural Resources and Livelihoods**  
**in Rural Konkan Region**

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**November 1999**

## **ACKNOWLEDGMENT**

The investigators hereby wish to express their gratitude for all those who provided help, support, and assistance in diverse forms. It is not possible to mention names of all these people. However, it will not be possible to go ahead without mentioning few names of those individuals whose contribution was critical in completion of this study.

First, the investigators wish to express their gratefulness towards Ms. H. Bedi of Community Aid Abroad, who provided encouragement and financial support for this project.

The investigators also wish to acknowledge and thank Mr. Amit Narkar and Ms. Anagha Mitra for providing research and field assistance.

The study was immensely benefited from not only the logistic and other support but also from the insightful interactions with the grassroots activists and common people in North Konkan. Special mention must be made of Mr. Arun Shivakar, Ms. Surekha Dalvi, Mr. Ashok Kadam, Mr. Ashok Saswadkar, Mr. Rajan Indulakar, Ms. Nancy Gaikwad, Mr. Govind Amre and colleagues in their organization.

The investigators also wish to acknowledge help and assistance provided by Mr. Prasanna Wagle and Ms. Vibha Wagle. It is also necessary to mention the patience and cooperation extended by Mr. Girish Sant and Mr. Shantanu Dixit of Prayas Energy Group, Pune.

The usual disclaimers apply.

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## 1. Introduction

Development and environment are the twin subjects of a rigorous and rich theoretical debate across the disciplines of physical and social sciences. This theoretical debate is not restricted only to conceptual issues or analytical exercises but lot of inputs for the debate come from the practical, ground level experiences of development programs and projects and their environmental and social implications. In other words, controversies over development or urban-industrial projects are major elements of the debate on development and environment.

A large number of project-controversies rather development-controversies have been erupting over diverse types of infrastructure, urbanization, industrialization projects or policies initiated in rural areas of the Southern countries. Critics of such projects tend to argue that these projects create severe impacts on some of the prime natural resources in the local are—land, water-bodies, forests, or air. Further, because of these impacts on natural resources, livelihoods of members of local rural communities, who depend on these local resources for their livelihoods, are affected to varying degrees. To counter these arguments, supporters of these projects try to demonstrate that the negative impacts of the project on surrounding nature are negligible, insignificant, and well within the threshold limits determined by scientific studies. They tend to dismiss the claims made by local people about the negative impacts as unfounded fears. The supporters also tend to claim that the local ecosystems are unproductive and hardly provide anything to local people. In short, until the controversies last, both sides continue making claims but tend to avoid direct confrontation on rational grounds. As a result, most of these controversies are decided in favor of the party, which can muster more political or economic powers. However, the crux of these controversies—arguments over the impacts of these projects on local nature and local people—remains unresolved. This is mainly because of the lack of detailed understanding, first, of the interrelationship of local ecosystem and local people, and second, of the impact on this interrelationship. A part of this lack of understanding could be attributed to lack of proper framework to look at the ground-reality in rural areas. This study is a limited and humble effort to address both these lacunae.

## 2. NRLP Linkages and Intrusions

Normally, members of the modern societies or, more precisely, of the “urban-industrial” systems, earn their incomes in money form and spend this money to satisfy their livelihood needs<sup>1</sup>. Further, they earn their incomes from a limited number of sources and through a limited number of activities (often one or two, for example, employment/job, business activities, or

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<sup>1</sup> Here, the term “urban-industrial system” implies the economic system that evolves around modern industries and urban habitats. It also includes the associated social and political systems that support the economic system.

some combination of the two). But, in the case of members of rural communities that still are outside the influence of urban-industrial system, the activities undertaken and the resources used for satisfying different livelihoods needs are diverse and complex in many respects. Let us see these distinctive characteristics of rural livelihoods situation in brief.

First, rural people satisfy their livelihoods needs using a variety of sources and through a variety of activities. Though sometimes a single activity (such as agriculture) or a single source (such as sea) is a major contributor, the contribution of other activities and of other sources to satisfaction of basic livelihoods needs is generally not insignificant. Second, the families staying in rural areas depend on or draw from the surrounding natural resources for satisfaction of a major part of their livelihoods needs. However, it needs to be mentioned that there is immense diversity in the degree of overall dependence of rural families on natural resources as well as in the nature and extent of utilization of different natural resources. This is possible only if these resources are yet to fall victim to the process of destruction or to the process of 'enclosure' initiated by the urban-industrial system. If the urban-industrial system has 'reached' the area, then livelihoods activities in these areas are not entirely dependent on the local natural resource system, but also draw partially from the urban-industrial system.

Thus, families residing in rural areas depend on or are linked with the natural resource system surrounding them for their livelihood needs. As a concept parallel to the 'urban-industrial' system, the economy of rural families that critically and largely depend on the surrounding natural resources could be defined as 'rural-natural' system or 'rural-natural' economy. Further, the complex mix of activities they undertake to satisfy their livelihoods needs requires a base of appropriate technological and other capabilities, along with a base of knowledge of potential and limitations of the surrounding natural resources. Both these—the capability base and the knowledge base—get evolved through accumulation of experiences and analyses over generations. Along with these two bases, the livelihoods activities of rural families are critically dependent on socio-cultural base—i.e., social norms and institutions as well as cultural practices. Further, the surrounding natural resources and livelihoods activities dependent on these resources on the one hand, and, on the other hand, cultural practices and social institutions as well as norms have a dialectical relationship—i.e., each shaping the other and shaped by the other. This totality of interrelationships between rural people and surrounding nature mediated through their livelihoods activities is called here 'natural resources—livelihoods—people' (NRLP) linkages. Figure 1 (appended at the end of the report) depicts these relationships in a graphic manner. As the previous discussion and the figure suggest, in a given region, a total picture of the NRLP linkages is very complex and dynamic.

Most rural (even tribal) communities are not completely isolated from the nearby urban-industrial systems. In this sense, the rural people and their surrounding nature are always exposed, though to varying degrees, to the urban-industrial system. In other words, the NRLP

linkages in rural areas generally have some interactions with the urban-industrial system. However, the scope and the intensity of these interactions change suddenly when some new development or industrial initiative is introduced by the urban-industrial system. This initiative, often, is in the form of a new policy or project. Whether industrial or development (infrastructure) projects, this initiative is almost always said to be aimed at development of the local area. In addition, infrastructure projects are justified on the basis of “national interests”. Hence, depending on their purpose or justifications, these initiatives could be called either developmental interventions or urban industrial projects. Whatever may be the justification, the explicit or implicit purpose of the most projects is to serve or satisfy some need of the urban-industrial system. In fact, these projects directly or indirectly cause or facilitate increased utilization of natural resources in rural areas for the benefit of the members of the urban-industrial system. Thus, because these initiatives by the urban-industrial system intrude upon livelihoods of rural communities and on rural natural resources on which these livelihoods depend, they are called in this report by the term ‘urban-industrial intrusions’ (or, sometimes, simply intrusions).

Such urban-industrial intrusions cause changes—often sudden—in the scope, speed, and intensity of interactions between the rural community and the urban-industrial system. These changes, in turn, create certain impacts on natural resources in rural areas, on livelihoods activities of rural families, or on satisfaction of livelihoods needs of local people. In other words, the urban-industrial intrusions cause certain impacts on NRLP linkages in the rural areas experiencing intrusions.

These urban-industrial intrusions have two distinct characteristics. First, urban-industrial intrusions often change the chemistry and physics of the crucial elements of the natural resource systems often in an irreversible manner. Nature and local people (and even the mainstream initiators of these changes) often are simply incapable of rebuilding the natural systems from the mess created by the impacts of intrusions. Second, the urban-industrial intrusion come with such political backing that the divestment of livelihoods sources from rural families through the intrusions is not only legitimized and sanitized but also made to appear beneficial to the victims. The rural people simply have no defense against this type of silent political invasion.

The impacts of intrusions are manifested at both the ends of the NRLP linkages. At the resource end (i.e., the ‘NR’ end), these are often reflected, among other things, in some form of disturbance in the availability, access, or control of rural families over surrounding natural resources. At the other end (i.e., the ‘P’ end), people react in a multitude of ways to the changes in scope and intensity of interactions with urban-industrial system caused by the intrusion. These reactions of local people include, on one hand, their efforts to hedge themselves from the ill effects of the disturbances in their relationship with the natural resource system. On the other

hand, these include efforts of rural people to exploit new avenues and opportunities for earning livelihoods that are created by the urban-industrial intrusions.

The next issue is the exact route of impacts. In fact, there could be three routes through which intrusions would affect the NRLP linkages. The first route through which impacts of intrusions affect the NRLP linkages has three distinct stages. In most situations, the intrusions first affect local natural resources by consuming / defiling / destroying them. This is the first stage. As a result of impacts on resources, livelihoods activities of rural families, which draw or rely heavily, in direct or indirect manners, on these natural resources, get affected. This is the second stage of impacts<sup>2</sup>. In the third and final stage, because of impacts on livelihoods activities, there is a fall in levels of satisfaction of various livelihoods needs of members of local rural families. In other words, the impacts of intrusion are finally felt by rural people in the form of reduction in overall livelihoods support they used to get from the surrounding nature. As a result, the security of livelihoods of some of the affected families comes under threat<sup>3</sup>.

The second route through which intrusions affect NRLP linkages is more direct. Instead of passing through a long chain of impacts as in the case of first route impacts of intrusions on nature (for example, pollution of water or air) directly affects peoples' bodies. Thus, these impacts through the second route are not only on their livelihoods and lifestyles but also on their health and their life span.

In the third route, intrusions first cause different socio-cultural, psychological, and cognitive impacts on people. These impacts involve changes in people in terms of their expectations, aspirations, choices, priorities, and even capabilities. This certainly affects rural people's perceptions of their livelihoods needs and even of their livelihood activities. This socio-cultural-psychological-cognitive path through which intrusions affect the NRLP linkages is not investigated in this study<sup>4</sup>.

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<sup>2</sup>These impacts on livelihoods activities manifest in diverse forms. Sometimes, the activity is preempted or stopped completely. Sometimes, the scope, duration, or intensity of the activity is curtailed to varying degrees. In some instances, the yield-levels or productivity-levels suffer, while, in some cases, quality of produce of livelihoods activities would get affected.

<sup>3</sup>This study is focused on impacts of intrusions on security of livelihoods of local people mainly through this route.

<sup>4</sup>However, investigators, during their study, could see some glimpses of these processes taking place in Konkan. These include: changes in life-style of a large number of people; unwillingness of many, especially young, people to "soil their hands" by working on land; loss of local people's confidence that through agri-horticultural activities they secure their livelihoods; hope and belief on the part of some local people that the changes caused by the intrusions and the forces which cause these changes are inherently good despite ample evidence to the contrary.

### 3. Objectives of the Study and Methodology

The starting point of this study was realization of a need to gain adequately in-depth and realistic understanding of ground situation surrounding urban-industrial intrusions, especially, the nature and extent of impacts of intrusions on local people and local nature. However, it is difficult to directly undertake a comprehensive research project aimed at detailed and elaborate study of this ground-reality. This is mainly due to the lack of sufficient understanding of substantive and methodological aspects of such a study as well as the lack of adequate experience of conducting such a study. Hence, it was planned to divide this effort in two stages. It was decided to begin by taking up a limited and short-term study in the first stage to get a qualitative picture of the impacts and the underlying social and physical processes. This qualitative picture would then be filled with qualitative nuances and quantitative data in the second stage through a detailed, comprehensive, in-depth, and obviously long-term study. This report deals only with the first-stage, short-term study aimed at creating a qualitative understanding and an overall picture of the impacts of intrusions on NRLP linkages.

Thus, the objectives of this first-stage study were decided as follows:

- (a) To document livelihoods situation prior to urban-industrial intrusions in terms of NRLP linkages in the chosen region;
- (b) To document the impacts of the urban-industrial intrusions on the NRLP linkages and to understand the ecological and social processes and mechanism that is set in action by the intrusions.

Coming to the methodology, the main objectives of this study do not require it to come out with some general conclusions on the basis of quantitative analysis of a carefully chosen sample. Rather, the objectives are qualitative in nature and are aimed at developing understanding and insights into impacts of urban-industrial intrusions on NRLP linkages. Commensurate with the nature of the objectives, the methodology adopted for the study is also flexible and relying on subjective and qualitative methods instead of elaborate sampling exercises, detailed surveys, and quantitative analyses.

The first methodological task was to zero in on a region for conducting the study. The northern part of the Konkan region in the state of Maharashtra was, in a way, an obvious choice for the investigators of this research for two main reasons. First, throughout this decade, Konkan especially, its northern part has been experiencing an onslaught of urban-industrial projects and developmental initiatives especially in the infrastructure sector. Second, both the investigators had previous knowledge and experience of working at ground level in the region.

With selection of the region, the next step was selection of the sites of intrusions in the northern Konkan region. Through initial visits, efforts were made to get some preliminary idea of the intrusions in each region and their impacts. Selection of intrusions for the study was made in such a manner that there would be some diversity in the nature, extent, and time frames of the intrusion as well as in the nature and intensity of their reported impacts. The initial visits were also utilized to identify local informants. The following three research tools were primarily used in the subsequent research: (a) study of the available literature; (b) semi-structured but extensive (individual or group) interviews of members of local communities; (c) open-ended discussions with other key persons who have worked or studied the related issues (including experts, researchers, and activists).

As the first step in the study, the investigators conducted extensive dialogues and discussions with grassroots activists and their local supporters from seven major groups/organizations active in the northern part of Konkan. A list of these institutions and areas of their operations are listed in Table 1. These initial interactions with activists were followed up by long, extensive, and open-ended discussions with people in the region. These local people included members of families affected in direct or indirect manners, other families from affected communities, community leaders, and people from other professions such as government employees and journalists.

**Table 1: Organizations Consulted and Areas of Their Operation**

	<b>Organization (Activist)</b>	<b>Area of Operation</b>
1	'Sakav' and 'Khar Dongri Mehanat Aghadi' (Arun Shivakar)	Pen and Panvel Taluka (Dist. Raigad)
2	'Shramik Kranti Sanghatana' (Surekha Dalvi)	Uran, Panvel, Pen, and Sudhagad Taluka (Dist. Raigad)
3	'Disha Kendra' (Nancy Gaikwad )	Khalapur and Karjat Taluka (Dist. Raigad)
4	'Gramvikas' (Govind Amre)	Mahad Taluka (Dist. Raigad)
5	'Nirmitee' (Ashok Saswadkar)	Sudhagad Taluka (Dist. Raigad)
6	'Parivartan' (Ashok Kadam)	Chiplun and Guhagar Taluka, (Dist. Ratnagiri)
7	'Shramik Sahayog' ( Rajan Indulkar)	Chiplun and Guhagar Taluka (Dist. Ratnagiri)

To bolster the understanding gained from these open-ended discussions, detailed, semi-structured interviews of forty-six individuals from different locations were conducted. Efforts were made to reach especially those who have experienced impacts of intrusions, either positive or negative. The number of interviewees is certainly not adequate to represent either the total population of the area or even the population affected by the urban-industrial intrusions in the parts of the region under investigation. This is not considered a methodological lacuna here because the objective of the study had never been to draw generalized conclusions. These interviewees, both men and women, were members of different communities—Agari, tribal communities such as Thakur and Katakari, Neo-Buddhist, Paradhi, and Maratha-Kunabi communities. These interviewees came from areas affected by different types of intrusions, including industrial projects, medium dams, private tourism projects, and road or bridge construction.

**Table 2: Areas of the Intrusions Studied and Their Impacts**

	<b>Area</b>	<b>Name/Kind of Intrusion</b>	<b>Impact of Intrusion</b>
1	Wadkhal-Nagothane Region (Pen Taluka) (Dist. Raigad)	Industries (Nippon Denro, Johnson Tiles)	Loss of land and creek-based resources
2	Nagothane (Sudhagad Taluka) (Dist. Raigad)	Industries (IPCL Plant)	Loss of land and creek-based resources
3	Kharpada (Panvel Taluka) (Dist. Raigad)	Bridge	Loss of land
4	Patalganga and Rasayani Industrial Area (Panvel Taluka) (Dist. Raigad)	Industrial area with many chemical industries	Water pollution of river; Loss of animals, cattle, fish
5	Morbe, Nariwali (Khalapur Taluka) (Dist. Raigad)	Irrigation: Dam (Medium)	Displacement; Loss of agricultural land
6	Tembhari (Khalapur Taluka) (Dist. Raigad)	Bombay-Pune Expressway	Displacement of Katkaris
7	Tadgaon (Sudhagad Taluka) (Dist. Raigad)	Hill-station	Loss of land and forest-based resources; Loss of road access
8	Hetawane (Pen Taluka) (Dist. Raigad)	Irrigation: Dam (Medium)	Displacement; Loss of agricultural land
9	Birwadi Area (Mahad Taluka) (Dist. Raigad)	Industrial area (Chemical Industries)	Loss of land; Water pollution
10	Poshire-Borgaon (Karjat Taluka) (Dist. Raigad)	Irrigation Dam (Medium)	Loss of land
11	Lote Parshuram (Chiplun Taluka, Dist. Ratnagiri)	Industries (Chemical Industries)	Air and water pollution; Loss of land; Loss of fish
12	Anjanvel, (Guhagar Taluka, Dist. Ratnagiri)	Enron Power Project	Loss of land; Impact on fish

For conducting these interviews and discussions, about twelve different areas (or pockets) affected by different intrusions were specifically visited. Table 2 presents information on these areas affected by intrusions. The first column of the table contains the name of the village or area with its geographic details (such as names of taluka and district in which they fall). The second column indicates the type of main or sole intrusion in the area (there are more than one intrusion in many areas). The third column of the table identifies major impacts of intrusions experienced in these areas. Out of the twelve areas listed, ten are from Raigad district spread in six talukas south or east of the Mumbai metropolis, while the rest two areas are from the two northern taluka of Ratnagiri district. The fact that Raigad district has become a new home for chemical industries could be seen reflected in the second column of the table. In the list of impacts, two types of impacts come out prominently (a) loss of land primarily through acquisition or purchase, and (b) chemical / thermal pollution of water-bodies.

#### 4. Pre-Intrusion Situation in Konkan: Livelihoods and Natural Resources

In this section, we present findings of our research in relation to the first objective of the study—to document livelihoods situation prior to urban-industrial intrusions in terms of NRLP linkages and livelihoods activities of rural families in Northern Konkan. We begin by identifying and discussing the important livelihoods activities, major livelihoods needs, and main natural resources used in Konkan.

##### 4.1 Livelihoods Activities, Basic Needs, and Resources Used

In order to paint a picture of NRLP linkages in Konkan before intrusions, we begin by listing livelihoods activities undertaken by people in rural areas of Konkan. This is followed by the list of livelihoods needs satisfied by these activities as well as the list of resources and inputs utilized to conduct the activities. These three sets of the major elements of the NRLP linkages are presented in Table 3.

**Table 3: Livelihoods Activities, Needs, and Resources Used in Konkan**

Natural Resources Used	Livelihoods Activities	Livelihoods Needs Satisfied
Land, Water, Biomass, Dung-Manure, Animals (for power needs)	Agriculture/ Horticulture	Food, Fuel, Cash-Income, Fodder, or Shelter
Creeks, Rivers, Rivulets, Sea	Fishing	Food (Supplements), Cash-Income, or Manure
Forests, Pasture and Waste lands, Creeks, Sea-Coasts	Collection	Food (Supplements), Fodder, Fuel, or Cash-Income from Sale
	Wage-Labor	Cash-Income, Food, Fodder or fuel
	Service Provision	Cash-Income, Food, or Fodder

The main livelihoods activities in the region are: agriculture, and/or horticulture; fishing; collection of various items mainly from forests, pasture-lands, and waste-lands (called hence further only as 'collection' activity); wage-labor; and provision of artisanal and other services (called hence further 'service-provision' in brief). The material produced or collected through agriculture, horticulture, fishing and collection activities is either used for self-consumption or sold (or bartered) in local markets<sup>5</sup>. To carry out these livelihoods activities, rural people draw heavily from surrounding natural resource system, comprising the following four primary natural resources—land, forests, water-bodies (ponds, rivulets, rivers, creeks, and seas), and air. The livelihoods activities also rely on various natural inputs that are derived from these primary natural resources. The basic livelihoods needs that are satisfied by undertaking these activities include: food (including drinking water), fuel, shelter, clothing, fodder, medicines, and cash-income to satisfy some of these or other needs<sup>6</sup>.

These separate lists of activities, needs, and resources provide us a preliminary idea of NRLP linkages in the region under study. However, in order to get more in-depth understanding, we need to focus on what are more significant and critical elements in these three categories. Our observations indicate that the following four livelihoods activities are significant from the point of view of families in the region studied—agriculture / horticulture, fishing, collection, wage-labor, and 'service-provision'. The primary natural resources that are crucial for conducting these activities are—land, water-bodies, and forests.

Coming to livelihoods needs, food, shelter, fuel., fodder, and cash-income are the basic livelihoods needs of rural people in Konkan. However, in the region, satisfaction of the two basic livelihoods needs—viz., food and cash-income—is observed to consume a significant portion of total support needed by livelihoods of rural families. It is obvious that, in the 'subsistence' economy of Konkan, satisfaction of the need for food, which is a bare necessity for the very survival of human beings, is crucial. Though cash-income cannot be called a basic livelihoods need in the physical sense of the term, it is found to be key livelihoods need in the areas studied, despite the rural character of the areas. This is because of peculiar circumstances prevailing in the region. In a perfectly 'subsistence' (or barter) economy, cash-income need not be considered a livelihoods need at all. However, the local economy in the area under study,

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<sup>5</sup> Apart from these major livelihoods activities, some families, which are exceptional and are negligibly small in numbers, earn entire or a major part of their livelihoods support by undertaking activities such as scavenging and begging. It is possible that some engage (or are forced to engage) in activities that are not permitted by law.

<sup>6</sup>In order to get a better understanding on this issue one can get into deeper analysis by further detailing these needs. For example, the food need could be broken down into staple food need, need for protein items, and need of supplementary food items. However, for the sake of brevity, it is not undertaken in this preliminary study.

though underdeveloped, is considerably exposed to the urban-industrial system centered in Mumbai. As a result, cash-income plays very important roles even for rural families in obtaining their livelihoods support.

## **4.2 Pre-Intrusion NRLP Linkages in Konkan**

With this understanding as a base, we now look into the linkages between the local natural resources and livelihoods needs mediated through livelihoods activities that make significant contribution to the livelihoods support of local families. The accompanying figure (Figure 2, appended at the end of the report) depicts the following five major linkages, identified by the resource and activity involved: (a) land—agriculture linkages; (b) water (-bodies)—fishing linkages; (c) forest—collection linkages; (d) agricultural / fishing—(wage)-labor linkages; (e) agricultural / fishing—service (-provision) linkages. The last two livelihoods activities do not have direct linkage with any natural resources, however, they are dependent on primarily the first two livelihoods activities carried out by the others, which, in turn, are dependent on natural resources. In other words, the last two linkages in the list are indirect linkages between livelihoods activities and the surrounding natural resource system acting through the first two linkages.

The 'land—agriculture' linkage is primarily rooted in the capacity of land to generate biomass. Lands in Konkan are of different physical types, under different types of ownership, and are put to different uses. In the valleys in the region, there are flat, alluvial lands that are put to agricultural uses, especially to grow paddy and some pulses. Similarly, flat mountaintops as well as slopes of mountains with adequate soil cover are used to grow coarse grains such as Nachani and Vari as well as pulses like Kulith. Apart from these, there are large tracts of undulated lands that are often classified as pasture lands, wastelands, and forestlands. These are suitable for carrying out horticulture and collection activities. The land-ownership is predominantly private, even there are some privately owned forest areas in Konkan. Besides these, there are some community-owned lands. Government departments such as forest department and revenue department own the rest of the land.

Though not as intensive and high yielding as in the other parts of the country, agriculture and horticulture in Konkan remain prime livelihoods activities undertaken by local people. The agricultural produce in Konkan region includes staple grain crops (such as Rice, Nachani, and Vari); pulses (like Moog, Kulith, and Waal); and oilseeds (like groundnut). Along with the seasonal vegetables, the main varieties of horticultural produce in Konkan include fruits like Mango, Cashew Nut, Jackfruit, Coconut, Kokam, Karvande (black berries), and Papaya. A large part of horticultural production is exclusively for self or family consumption. But, Konkan is also famous for commercial and large-scale production of Mangoes (especially the high-quality Alphonso and Payari varieties) and Cashew Nuts. The agricultural and horticultural produce is

primarily used for satisfying the basic livelihoods needs of the family. Many families sell a considerable portion of their agricultural and horticultural produce in local and distant markets to earn cash-income.

Coming to the 'water—fishing' linkage, Konkan is a region with high rainfall and proximity of sea. As a result, there are a large number of water-bodies—containing both fresh and saline water—of different sizes. These include: village-ponds, rivulets, rivers, creeks, and the sea. Though most rivers are not perennial, the creeks and sea front provide considerable opportunities for conducting fishing activity through out the year. Fishing is the main source of earning livelihoods for many families in coastal areas and areas surrounding the creeks. Fish serves as a major source of food-protein for a large number of people in the Konkan region. Fish is also sent to local and outside markets from this region in large quantities.

The third linkage is 'forest-collection' linkage. Konkan has forest areas of different types and densities and with different ownership patterns. There are private forests, forests on community lands, and state-owned forests. A large number of local families rely heavily on these forests (irrespective of their ownership of these forests) for satisfaction of their basic livelihoods needs. They usually collect firewood, fodder, fruits, vegetables, timber as well as other type of shelter material (such as straw, grass, bamboo, and reeds), and various other items often identified as non-timber forest produce (such as honey, gum, and resins)<sup>7</sup>. These collected items are used for self-consumption or sold in the local market to earn cash-income. It is important to note that this activity provides critical livelihoods support to many families that are without any private assets, especially the forest-dwelling, landless, and 'women-headed' families.

The wage-labor activity provides (partial or significant) livelihoods support to a large number of families in Konkan. Though not explicitly linked with any natural resources directly, wage-labor activity is, however, mainly connected with agriculture/horticulture activities or fishing activity. Wages in cash or kind are earned against performance of work, mostly physical work. This is different from activities that involve exchange of labor wherein people help each other by working for each other. Opportunities for wage-labor have been of critical importance for small and marginal farmers' families as well as for landless families. These wage-labor opportunities in pre-intrusion local economies include labor work in agricultural, fishing and household operations counted out by farming and fishing families. This also include employment, often seasonal, in local enterprises such as shops, agro-processing units in other village-industries and in some 'Service-provision' activities (for example, bamboo-weaving)<sup>8</sup>.

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<sup>7</sup> In Konkan, instead of collecting fodder, cattle are often left in the nearby forest area to graze after the kharif season (that occurs in the monsoon months of June to October) of agriculture is over.

<sup>8</sup>The local agro-processing units include units for mango processing and cashew nut processing as well as

Apart from these, there are ‘white-collar’ jobs and employment such as those of teachers, village-level auxiliary midwives/nurses, village postmen, and other jobs in government agencies or in local self-government bodies. However, these are permanent and secured jobs that have little connection with the surrounding natural resources. As a result, these are generally not affected by the urban-industrial intrusions. Hence, these types of jobs are not included in this category and are not discussed in this report.

Finally, in rural Konkan, there are some artisan families, which provide various goods and services to local agricultural and other families. These artisan families continue to earn a part of their livelihoods support by undertaking activities that provide artisanal services such as carpentry, iron-smithy, tailoring, and cobbler’s work. These artisans are mostly from artisanal families, which used to engage in ‘*balutedari*’ work in olden days. (The ‘*balutedari*’ system used to involve a yearly-payment by farmers usually in the form of some portion of agricultural produce against services rendered by artisans or craftsmen to farmers through out the year<sup>9</sup>.) We include from our analysis, livelihoods activities which could be categorized as trade, business, or professional activities, have less to do with NRLP linkages and are not directly or significantly affected by urban-industrial intrusions.

Thus, these five NRLP linkages, together, provide a part of the picture of pre-intrusion livelihoods situation in the region under consideration.

## 5. Impacts of Intrusions on ‘Resources—Activities’ Linkages

We now turn to the next objective of this study—to document, the impacts of urban-industrial intrusions on NRLP linkages in rural areas of northern Konkan and to understand the ecological and social processes and mechanisms set in action by the intrusions. Findings of our study in the context of this objective are presented in this and the next section. In this section, we focus on the impacts of intrusions on the linkages between local natural resources and livelihoods activities in the region under study. In the next section, we present implications of these impacts on resources and activities for satisfaction of major livelihoods needs of rural

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rice, *poha* [i.e., rice flakes], and flour mills. Similarly, the village industries include brick-kilns, grass bundling, and salt pans.

<sup>9</sup> In the earlier days, working under the traditional ‘*balutedari*’ system, many families used to earn entire or a major part of their livelihoods support by providing various services to farming families. There are twelve types of primary service-providers (*balutedar*) and a bigger number of secondary service-providers (*alutedar*). These included traditional craftsmen and artisans such as ironsmiths, carpenters, goldsmiths, and hairdressers. In post-independence era, this system broke down. However, a considerable number of families continue to provide these services, but mostly against cash payments. These families, normally earn only a small portion of their livelihoods support from these activities and have to undertake other (one or more) of the major livelihoods activities.

people<sup>10</sup>.

Before we go to impacts on the NRLP linkages, it is interesting to look at some insightful observations about impacts of intrusions on surrounding nature and resources made by local people during our interviews and discussions with them. These observations not only helped us understand how diverse and deep are impacts of the intrusions on nature, but we could also get some glimpses of attitudes of local people toward nature. Some of these observations are listed in Box 1.

## **5.1 Impacts of Intrusions on ‘Land—Agriculture’ Linkage**

With this background, we now get into the details of impacts on NRLP linkages. Let us begin with the most depended upon ‘resource-activity linkage’, viz., ‘land-agriculture’ linkage. The first element in this link is land. Here, land includes all types of lands, while agriculture includes horticulture. In a country with high population density like India, land is a precious asset. Moreover, in a narrow, hilly region like Konkan, plain, fertile agriculture land becomes a key, trusted, and assured source of livelihoods support not only for the land-owning family but the entire local community. Even the hilly and undulated lands, on which there are pastures, forests, and horticultural plantations, contribute substantially to satisfaction of a variety of livelihoods needs. The urban-industrial intrusions affect these livelihoods benefits drawn from different types of lands in diverse ways. The following are our observations on how different types of intrusions cause impacts on agricultural activity, as they affect the ‘capacity’ of lands to provide livelihoods support. Along with this, there is some discussion on the processes and mechanisms that are instrumental in creating these impacts.

The first and the most frequent mechanism set in action by intrusions that affects land is acquisition of lands (private, common, or public) by government departments and agencies for various industrial and infrastructure projects<sup>11</sup>. As a result of acquisition, the landowners lose their ownership and control over land, while the other local families (who draw various inputs for their livelihoods activities from the lands) lose their access to these lands. The acquired lands

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<sup>10</sup> This scheme, instead of dealing with one NRLP linkages at a time, is preferred here in order to provide a more organized picture, without being repetitious, of impacts of intrusions on people in the region.

<sup>11</sup> Such acquisition has a colonial legacy. The Land Acquisition Act of 1894 allowed government to acquire privately owned lands for “public” purposes. The act mandated a legal process for acquisition of land and gave a right to the landowners to question the acquisition. However, in practice, there was very little scope for questioning the acquisition. The Act was amended in 1984 in some respects. However, there was not much improvement as far as meaningful participation of local people in deciding fate of their land and other natural resources on lands surrounding them is concerned. In recent years, the state government in Maharashtra is acquiring land under the Maharashtra Industrial Development (MID) Act, which is alleged to be less participatory and more draconian.

include different types of lands (agricultural, pasture, forest, and wastelands) that are under private ownership. Along with these, publicly owned lands are also allotted for these projects and handed over to project authorities.

**Box 1 : Observations of Local People: Impacts on Nature and Resources**

- Nutritious *Marvel* grass, which used to grow on the banks of the creeks and was fed to milking cows and buffaloes, is now extinct.
- A local variety of scented grass, called '*Dhopa*', is also extinct.
- Unscientific land filling by the new industrial plants blocked the natural drainage routes and resulted in flooding of agricultural land on the upstream side.
- Because of increased fertilizer use, there is increased leaching of harmful chemical substances into creeks and rivers. As a result, fish population, especially of small-sized varieties, is considerably depleted.
- The first victim of air pollution is the *Shevaga* plant. It is highly susceptible to polluted air and, in turn, acts as an indicator of even small traces of pollution in air.
- The three major reasons for reduction in the number of big cats and other bigger species of wild animals in the local forests are—forest destruction, poaching, and accidental deaths due to the new Konkan railway.
- Railway embankments, industrial pollution, air pollution, and water pollution severely harm snakes, birds, insects, and frogs, the animals that help agriculture. As against this, it results in growth of rodents and crabs that either is harmful or not specifically helpful for agriculture.
- In the plain areas along creeks, agricultural land is flooded with saline water, while the forests bordering these plains are vanishing fast. As a result, all fodder sources are dried out, hence, people staying in these areas are selling or even donating cattle.
- Pollution of Patalganga river and air pollution in the area have severely affected yield of paddy.
- Tribal people (people residing in forest areas) cut down forests excessively—a complaint by Agari community settled in plains area.
- Now even Agari people (agricultural community residing in plains) flock to forest (for fuel and fodder) and put additional burden on it—a complaint by people from tribal communities.
- With reduction in forest cover, bird population and, especially the number of peacocks, has drastically reduced.
- Butterflies and other insects die an unnatural death as they are attracted, in a large number, to glaring, high power (candescence) lights put up by new industries to light up their premises.

The access of local people to the publicly owned land is then also cut-off and people are barred from drawing livelihoods support from this land also. Generally, when private land is acquired, the landowners are given compensation in terms of some land or cash.

The second mechanism through which people lose ownership, control, or access to land is (voluntary) sale of privately owned land. When the intrusion arrives, a farmer, who has been a participant in a less-monetized rural-natural economy, gets easily enticed by the apparently large amount of cash offered to him as sale-price of land. Generally, undulated and waste (*warkas*) lands with pastures or forests are sold by farmers and they do not easily part with flat agricultural lands used for growing paddy<sup>12</sup>. However, though the lands that are sold are mostly wastelands and parting with land is a voluntary act, the fact remains that the owners or tillers of these lands as well as the other people in local community, who use these lands for livelihoods purposes in diverse ways, lose an important source of livelihoods support. While the landowners get cash in return, the other people in community do not get anything in return of the loss they suffer.

These first two processes—acquisition and sale of land—preempt the agricultural or horticultural activity simply because the land that is sold or acquired is no more available for conducting the activity. Even loss of access to or ownership of forestlands, pasture lands, or even wastelands affect agricultural or horticultural activity. This is because agricultural operations carried out by local people critically depend upon biomass material—such as twigs, leaves, and small branches—collected from forests, pastures, or waste lands. Similarly, loss of availability or access to biomass used as fodder—also obtained from forests, pastures, or waste lands—makes it impossible for people to maintain cattle. Non-availability or scarcity of cattle, in turn, makes it difficult, if not impossible, to carry out critical agricultural operations. This also affects agricultural operations<sup>13</sup>.

The third process— i.e., chemical pollution—that impacts on land affects its productivity. Pollution, which involves defilement, deterioration, or destruction of land, is caused, often, due to discharging or seeping of industrial effluents into the land or due to flooding of land by polluted water. This causes severe erosion in productivity of land as far as agricultural or horticultural operations are concerned. The nature and extent of impacts of this pollution on productivity of land depend upon the type and concentration of pollutants. Such pollution of land is quite rampant in areas around sites of industrial activity in Konkan<sup>14</sup>.

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<sup>12</sup> For an absentee landowner, the land, often, does not serve any economic purpose other than being an asset for sale or a speculative investment. Hence, such an offer is a windfall gain for him. As a result, absentee landowners do not mind selling even paddy lands, which are often tilled by local farmers.

<sup>13</sup> In fact, impacts on agriculture activity also have implications for the activity of cattle rearing. Paddy farming provides a considerable amount of paddy straw, which used to be the major component of fodder supply in Konkan. Similarly, scarcity of adequate and clean drinking water as well as destruction of locally grown nutritious fodder supplements (such as *Marvel* grass) are also processes that adversely affect the cattle-rearing activity.

<sup>14</sup> Government agencies prove too inefficient and inadequate and their procedures prove too ineffective to

A related important process is impact of urban-industrial intrusion on another primary natural resource, viz., chemical pollution of air. Chemical pollution of air is a serious affair as it not only affects livelihoods activities (especially agricultural or horticultural) but also, in many cases, severely affects health of human beings residing in the vicinity. However, occurrence of air pollution at local level has not received proper attention. This is because of the absence of adequate equipment and manpower to enforce existing laws and also because of the callous neglect by officials responsible. As a result, people residing around the chemical industries get “trained” to endure the foul smell and discomfort caused by highly polluted air they breathe.

Pollution introduces harmful substances into land changing its chemical composition. Some of these substances directly affect the plants, while some destroy the microbial activity in soil that is essential for growth of plant. Sometimes, though plants can grow, the quantity or quality of produce is severely affected. Further, because most of these industrial pollutants are not degraded or broken down through natural processes, they remain active in the soil for long time periods, if remedial actions are not taken.

Similarly, air pollution severely affects some agricultural and horticultural activities and especially their productivity and quality of their produce. It is observed that horticultural production is severely affected in areas experiencing frequent incidents of air pollution. This is true in the case of not only delicate products such as mangos and drumsticks but also of crops such as cashew nuts, which are otherwise considered hardy. Pollutants in air also said to have serious impacts on crops of pulses like *waal* grown in post-monsoon season<sup>15</sup>. The effect of air pollution on agriculture or horticulture could be seen not only in quantity of production but also in terms of degraded quality of produce. This is especially true in the case of fruits and vegetable crops. Impacts on the quality of fruits could be witnessed in the form of deterioration of various characteristics such as color, texture, smell, and taste. Sometimes, these characteristics are changed so that the produce becomes unfit for sale or even self-consumption.

The fourth process affecting land witnessed in some parts of region is flooding of prime agricultural land by saline water from creeks. The dykes or bunds, which are meant for protecting the adjoining agricultural land from creek water and which are expected to be maintained by a special government agency, are currently in a state of disrepair. In Pen taluka of Raigad district, because of the new steel plants and other industries in the area, there is continuous traffic of heavy barges in the Dharamatar creek that was hitherto unheard of<sup>16</sup>. It is

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stop such pollution and to give any significant relief to the victims of chemical pollution of land.

<sup>15</sup> The crop of *waal* gets its requirement of water from moisture condensed in the form of morning dew. Polluted air results in ‘acid dew’, which harms the pulse crop of *waal*.

<sup>16</sup> Similar problems are reported to exist in the creek in the Alibag taluka of the same district due to a steel plant at village Salav.

observed that such traffic causes continuous pounding of protective dykes by big waves. This, in turn, further erodes the dykes, which are already weakened due to neglect and make them more vulnerable. As a result, when there is increased quantity of water in the creek during the rainy season, the dykes give in and through the breaches in these dykes saline water floods onto the agricultural land<sup>17</sup>. Once land is inundated by saline water, it is said that, paddy cannot be grown for the next three years.

Another related process affecting agricultural land, especially in low-lying areas, is flooding and submergence of land by storm water (i.e., rain water) for extended periods. This increase in extent and duration of submergence of land is said to be an impact created by two factors—(a) tall embankments built for railway tracks, roads, and bridges, and (b) plugging of natural drains due to land-filling operations by industries. Though it is not as destructive for lands as in the case of flooding of saline water, submergence of the paddy crop under storm water for an extended period causes considerable loss in the yield of paddy crop, in both quantitative as well as qualitative manner.

Apart from these major processes initiated by intrusions that cause severe impacts on land, there are many indirect or subtle processes by which utility of land for carrying out agricultural and horticultural activities is diminished. First, once lands are taken over, because of construction and other activities the land and soil structure is altered drastically causing severe impacts on land, soils, and water-bodies in areas on downstream or upstream side depending upon the changes/ alterations made<sup>18</sup>. Second, it was reported by the local activists that, in Sudhagad taluka of Raigad district, forest officials are forcing local farmers not to engage into agricultural or horticultural activity even on their own private lands simply because these lands adjoin forest lands owned by the department.

## **5.2 Impacts of Intrusions on ‘Water—Fishing’ Link**

Let us now move to impacts of intrusions on the second important resource-activity linkage, i.e., ‘water-fishing’ linkage. The element affected by intrusions is water or rather water-bodies. The first major disruptive process is chemical pollution of water-bodies of all types saline

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<sup>17</sup> When high tide and heavy rains coincide, water gushes in the creek from both the sides—viz., from high seas and from rain-soaked lands. When this takes place, there is considerable increase in the quantity of water in the creek that exerts tremendous pressure on the land-protecting dykes. In this situation, the ill-maintained and eroded dykes stand no chance.

<sup>18</sup> This is not a hypothetical possibility. In Pen taluka, land-filling operations by one industry affected the natural drainage channels in the watershed, about 800 hectares of land on the upstream side of this industrial site gets submerged under storm (rain) water for weeks together, severely affecting its productivity.

and fresh water as well as surface and underground. There is another form of pollution, distinct from chemical pollution, called thermal pollution. This is caused, especially, by thermal power projects. Thermal power projects take in water from water-bodies for cooling purposes and release hot water back in natural water-bodies. No chemicals are mixed in this out-flowing water but its temperature is higher than that of water in natural water-bodies. This is called thermal pollution<sup>19</sup>. Chemical and thermal pollution cause severe impacts on livelihoods of local people relying on fishing activity.

The second process causing impacts on livelihoods benefits drawn from water-bodies is increased traffic of heavy vessels. Such traffic restricts access of local fisher-folks (who work with small, hand-paddled boats) to the creek as they face danger of collision with the fast-moving big vessels. Movements of big boats bars local fisher-folks from fishing in the deeper central channel of the creek which, in fact, is highly productive for fishing activity. Local fisherman also have to endure frequent financial losses due to destruction of their nets even if these nets are pitched outside the central channel allotted for movement of the heavy boats. Most importantly, it is observed by local people that continuous movement of heavy boats making great noise affects fish population and their reproductive activity in the creek.

As a result of these processes, fishing activity, which critically depends on the health of water-bodies, is severely affected in many parts of Raigad and Ratnagiri districts of Konkan. The impact of these two processes on water bodies and, hence, on the viability of the fishing activity could be witnessed in diverse forms. First, there is palpable loss in production of fishing activity across the region. In other words, fish catch from the affected water-bodies is considerably reduced in quantity. Second, many fisher-folks also believe that production even in near and distant future is in danger because damage caused to the ecology of water-bodies by these process has also resulted in the loss of reproductive potential of local water-bodies in the case of many fish species. Third, local fishermen fishing in the creeks and rivers complain that the diversity in fish species has also drastically reduced. Depending upon the area and quality of water, local people could count fifteen to twenty species, which they used to catch in the past. As against this, the number of species that are currently found is said to be about five to ten depending upon the nature and extent of impacts on the water-bodies. Some varieties of fish,

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<sup>19</sup> Legally the out-flowing hot water is allowed to be at temperature, which is, typically, 5<sup>o</sup>c higher than the temperature of water in local natural water-bodies. It is said that this difference in temperature is well within the technically allowable threshold and, hence, won't be harmful to the aquatic life in the water-body. However, there could be two problems in this situation. First, in the absence of strict enforcement, the thermal pollution is not taken as seriously as chemical pollution and this threshold limit is not strictly followed. Second, it is often said that aquatic ecology is too complex and diverse, whereas the impact assessment studies carried out are really not that comprehensive and in-depth. Hence, relying on the threshold values of release temperature based on such studies could be dangerous for local ecology. As a result, it is said that, despite so-called 'scientific' proclamations, thermal pollution often proves harmful for the aquatic ecology and for the fish production in the water bodies.

which used to fetch a fabulous price in local or distant markets such as *pala* (favorite in local market) or lobsters (favorite in urban markets) are now almost extinct in the area. Finally, in some areas fishermen are found to curtail or stop fishing activity due to frequent incidents of accidents involving damage to human beings, small boats, and nets caused by the big boats operating in the creek.

### 5.3 Impacts of Intrusions on ‘Forest—Collection’ Linkages

In the region under study, the third important ‘resource-(livelihoods)activity’ linkage is the ‘forest-collection’ linkage. The urban-industrial intrusions cause severe impacts on forests through a variety of processes. One major and frequent process causing impacts on forests is cutting and clearing of forests to make way for industries, roads, and bridges. The second such process is submergence of forests lands under reservoirs created by dams. The third process is enclosure of forests for private or public purposes. In this process, the forest may remain intact and even reinvigorated in some cases. However, people are barred from occupying, entering into, or using forests<sup>20</sup>. The fourth process is increase in pressure on forests because the other sources of food, fodder, and fuel are depleted. These depleting sources include agricultural and fishing activities as well as pasture and waste lands. As a result, there is increased demand for and harvesting of collectable items from forests. The fifth process is degeneration of forests due to lack of care and efforts for conservation of forests<sup>21</sup>. While owners of private forests lands are not interested in or capable of conserving forests, the government forest departments simply have failed to perform their minimum duties to a variety of reasons.

As a result of the first two processes, area under forest is reduced, which could be termed as quantitative erosion. The last two processes result in qualitative erosion of forests, which involves reduction in density and diversity of forest. The third process causes curtailing access of local people to forests.

As a result of these processes affecting quality and extent of forests as well as access to forests, there is considerable impact on the livelihoods activity of collection of various items (of biomass and other material) This impact could be seen in two forms. First, due to these processes, there is considerable reduction in availability of and diversity in collectable material from the forests. The materials, which become scarce, include drinking water and all sorts of biomass as well as animal products. The second form of impact is preemption of the collection

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<sup>20</sup>This has typically happened in the case of private holiday resort projects.

<sup>21</sup>This process is not directly rooted in intrusion, though it is exacerbated due to intrusions. When the governments adopt policies encouraging intrusions, even at the expense of forests and environment, the forest officials lose interests and initiative. Even the owners of private forest see these policies as an opportunity for windfall gain. The local people, who are powerless against the government and project authorities, also get enticed by dreams of new opportunities and neglect forests in their surrounding areas.

activity especially because the forests are destroyed or because access of local people to existing forests is curtailed.

## **5.4 Impacts of Intrusions on Wage-Labor and ‘Service’-Provision Activities**

Apart from these three major direct linkages between natural resources and livelihoods activities, as mentioned before, there are other equally important indirect linkages involving two livelihoods activities, viz.; wage-labor and artisanal services.

Coming to the ‘wage-labor’ activity, the intrusions set in action different and even contradictory processes affecting this activity. First, because of reduction in the scope and volume of agriculture, horticulture, and fishing, opportunities for wage-labor in local economy, which are created by these three activities are also reduced. Second, in addition to this demand contraction, there is increase in labor supply in the local economy. This is because participants in agriculture, horticulture, and fishing, who no more receive adequate livelihoods support from these activities, flock into local labor market. For these new entrants, who were not hitherto depending on wage-labor activity for livelihoods, wage-labor becomes the last resort in the local economy. The third process that creates somewhat contradictory impacts is generation of new jobs by the intruding project. Here, we are not referring to ‘white-collar’ or ‘high-skill’ technical jobs but petty jobs requiring unskilled physical labor<sup>22</sup>. In the initial period of intrusion, a large number of labor jobs are created due to construction activity related to the project and the secondary activities started by local people using compensation money (such as house-construction). However, there are severe limitations on these jobs also. Instead of hiring unskilled workers directly, the industries ‘source out’ these unskilled jobs involving physical labors to outside contractors. These contractors pay less and working-conditions they provide are sub-standard and often hazardous. Moreover, these contractors prefer labor from outside the local areas, because the contractors fear that local labor would get organized and exert pressure on them. This is true not only for physical jobs inside the factory but even for jobs outside the factory such as jobs in trench digging and soil-work. It needs to be mentioned here that these employment opportunities generated by intrusions (such as construction, transportation, food and beverages) are largely insignificant in number (compared with the number of local and outside job-seekers), temporary, and less remunerative.<sup>23</sup>

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<sup>22</sup> The ‘white-collar’ and ‘high-skill’ jobs, anyway, are often out of reach for most of local people as they are said to lack the necessary qualifications, training, or skills. Local people cannot compete with outsiders even for semi-technical jobs such as those of fork-lift-operators, machine-operators, or even drivers.

<sup>23</sup>This issue is discussed in detail in later sections.

The second activity having indirect linkage is 'service provision' by local artisans. This activity experiences three types of impacts of the urban-industrial intrusions. First, because of reduction in scope and volume of agriculture, horticulture, and fishing activities and the resultant slow-down of local economy, there is considerable fall in demand for goods and services produced by local artisans competing with local products. Second, because of intrusions, there is considerable increase in exposure of local economy to urban-industrial system and to products coming from outside. As a result, there is supply and availability of a wider range of products that are better, cheaper and more attractive suddenly appears in the local market. The products and services of local artisans cannot stand this competition and there is further slump in their demand. However, if local artisans show some adaptability and enterprise, it is observed that some of them make better use of increased exposure to outside world due to the intrusions.<sup>24</sup>

Thus, what emerges at the end of this discussion is a complex and varied picture of impacts of urban-industrial intrusions on the NRLP linkages in the North Konkan region. Table 4 depicts this picture in tabular form.

## **6. Impacts on Satisfaction of Livelihoods Needs**

We come to the second component of our analysis of impacts of urban-industrial intrusions on the NRLP linkages in Konkan—viz., implications for satisfaction of major livelihoods needs of people. This analysis covers the following basic livelihoods needs—food, shelter, fodder, fuel, and cash-income. As food is the most important 'physical' need in the rural-natural economy of Konkan, impacts on food needs are investigated here in detail. Again, the emphasis of the analysis is on identifying and understanding the diverse impacts on satisfaction of livelihood needs, rather than on quantifying them to arrive at generalized conclusions. (Please refer to Table 5.)

### **6.1 Impacts on Satisfaction of Food Needs**

Let us begin with the most fundamental livelihoods need of human beings—food. The food needs are further divided here into the following elements—primary or staple food needs, protein supplements, fruits and vegetable, and drinking water. People of Konkan rely on the three local grain crops—paddy rice, Nachani, and, to some extent, Vari—for their staple food needs. It is observed that availability of these grains to local people is affected in the areas

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<sup>24</sup>For example, it is observed that some local tailors and carpenters, when they venture out of their villages are doing well.

experiencing the intrusions for various reasons.<sup>25</sup> First, productivity and production of grain crops in the affected areas have been affected, because of various factors that are discussed earlier. The second process affecting availability of staple grains is the sale of increasing quantities of (produced) grains by needy families. This increase in quantities sold is due to increased purchase of commodities to obtain the other elements of food or to satisfy the other livelihoods needs. This is mainly due to loss of livelihoods support provided by the other activities. The next two processes are observed more frequently. Third, in the case of families which rely largely on purchase of food grains to satisfy their staple food needs, availability of staple grains gets affected because of impact on their cash earning activities.<sup>26</sup> This reduction in cash-income could be due to impacts on the livelihoods activities that provide cash income. The fourth process resulting into impacts on access to staple grains is increase in sale prices of food-grains in local markets. One of the main reasons for this rise in prices could be the increased monetization of local economy, which, in turn, is the effect of the urban-industrial intrusions in the region.

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<sup>25</sup>As this is only a preliminary and qualitative study, this statement is not based on quantitative estimation. It is rather an observation that is based on interviews and discussions with people and inferences drawn from these discussions.

<sup>26</sup>Similarly, in the case of families which earn their grain supply (or food) through barter of other items or against labor, availability of grain may be affected due to impacts of intrusions on the wage-labor opportunities or on livelihoods activities providing the items that are bartered against grains or foods.

**Table 5: Factors/ Processes Affecting Livelihoods Need: A Summery**

Impacted Need	Causative Factor/ Process
Food : Staple Food	<ul style="list-style-type: none"> <li>▪ Loss of Productivity/ Production of Grain crops</li> <li>▪ Increased sale of agricultural produce of the family</li> <li>▪ Reduced cash-income of the family</li> <li>▪ Increase in sale-price of grains</li> </ul>
Protein Support	<ul style="list-style-type: none"> <li>▪ Decrease in availability of good-quality fish</li> <li>▪ High prices of fish in local</li> <li>▪ Decreased production of pulses and oilseed</li> <li>▪ high prices of pulses and oilseeds</li> </ul>
Other Supplements	<ul style="list-style-type: none"> <li>▪ Reduced production of fruits and vegetables</li> <li>▪ Quality of fruits produced severely affected</li> </ul>
Drinking Water	<ul style="list-style-type: none"> <li>▪ Pollution of local water-bodies</li> <li>▪ Curtailing of access to sources of water</li> <li>▪ Malfunctioning or neglect of water-supply schemes</li> </ul>
Shelter, Fuel, Fodder	<ul style="list-style-type: none"> <li>▪ Availability / Access to biomass products from agriculture, pasture or forests curtailed/ reduced (timber, straw, seeds, grass, twigs, etc.)</li> <li>▪ Increase in relative prices (relative to cash-income) and short supply of commodities/ material to be purchased (kerosene, roof-tiles, etc.)</li> </ul>
Medical Needs	<ul style="list-style-type: none"> <li>▪ Increase in diseases and ill-health</li> <li>▪ Government facilities inadequate and low-quality</li> <li>▪ Reduction in availability and credibility of traditional medicines/ knowledge</li> <li>▪ High fees of doctors and high cost of modern medicine</li> </ul>
Cash-Income	<ul style="list-style-type: none"> <li>▪ Reduction in production/ collection of salable commodities</li> <li>▪ Reduction in opportunities of wage-labor</li> <li>▪ Reduction in demand for services/ products of local artisan</li> </ul>

Now let us turn to the second element of the food needs—food items providing protein supplements. The major protein-supplement item in the regular diet of a large number of people in Konkan is fish. Availability of fish-proteins to local people is affected for two reasons. The first is decrease in availability of good quality, clean, and healthy fish in the local water-bodies (especially rivers and creeks) because of various processes described earlier. This factor is more relevant in the case of those who catch fish from local water-bodies for self-consumption. This decrease in availability of fish from local water-bodies also causes increase in prices of fish in the local markets. This price-rise, in turn, results in reduction in the consumption of fish by families who purchase fish, especially when their cash-incomes do not increase commensurably. Other important sources of proteins and other food supplements for people of Konkan are pulses and groundnuts. Production of locally produced pulses—such as Waal, Kulith, Moog—and groundnut is severely affected due to various processes<sup>27</sup>. At the same time, prices of pulses and oil in the local markets are at such level that local families, for whom cash is scarce, do not afford to purchase them in adequate quantities.

The third major category of food supplements is vegetables and fruits. In the case of vegetable, picture is somewhat mixed. In the areas directly affected by intrusions, the activity of growing seasonal vegetables for self-consumption is reported to be severely affected. However, in some villages around main towns and along some stretches of highway, there seems to be increase in vegetable production meant for sale. Similarly, the quality and quantity of fruits produced by or available to local people in certain parts of the region are severely affected due to reduced forest cover, reduced access to public lands, and air pollution. At the same time, different types of vegetables and fruits coming from the other parts of the state and country are found to be on sale especially near the industrial sites and settlements of people working in the industries.

The fourth and the most crucial element of food needs is drinking water. Availability of clean, safe, and adequate drinking water for local people is found to be affected in many areas experiencing intrusions. Even in this case, there are a variety of processes in operation. First, in the areas affected by intrusions, quality of water in many local water-bodies is affected due to chemical pollution. Second, access to local water-bodies, especially in the case of forest-dwelling families, is cut off when large tracts of forestlands are enclosed. As drinking water is a crucial need and its non-availability has serious political implications, in some cases, arrangements are made to supply drinking water to severely affected population by government or private agencies promoting the intrusions. But, more often than not, these arrangements fail

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<sup>27</sup> There is a very interesting reason for reduction in groundnut production at local level. It is said that, due to reduction in forest cover in upper ridges of Western Ghats, wild boars came down to the middle ridges and plain areas. These areas are now infested with wild boars, who have a special liking for groundnut and who dug up entire fields planted with groundnut, making ground-nut production a loss-making proposition.

to fulfill the promise of assured supply of clean and safe drinking water. In many cases, these arrangements are found to have become defunct in a short time.

## **6.2 Impacts on Satisfaction of Shelter, Fodder, and Fuel Needs**

The other important livelihoods needs of the local population are shelter, fodder and fuel. Generally, biomass material from public or common lands is used for constructing structures sheltering family members as well as livestock. This material includes timber, straw, reeds, grass, and leaves. Access to and availability of these biomass products gets reduced due to impacts on agriculture, horticulture and collection activities impacts of intrusions. Similarly, due to the combination of increasing prices and (absolute or relative) reduction in cash-income, purchasing other material for constructing shelters (such as roof tiles, galvanized iron sheets, or cement) from market becomes increasingly difficult for most of the families in the affected region.

Coming to the impact on satisfaction of the fodder need of cattle and other animals, the first important factor is reduction in availability of paddy-straw and other type of agricultural by-products used as fodder because of impacts of intrusions on agricultural activity. The second factor affecting supply of fodder is the reduction in area of fodder producing pasturelands and forestlands. Even availability of other locally produced items of fodder such as green grass or oil cake is considerably reduced because of impacts of intrusions on surrounding natural resources.

One of the major sources of fuel for people in Konkan has been the refuse and waste matter from agriculture, horticulture, and cattle-rearing activities. As the scope and extent of these activities are increasingly reducing, availability of the fuel material is considerably affected. The second factor affecting availability of fuel is reduced availability of fuel material (such as twigs, branches, leaves) that could be collected from wastelands and forestlands as a result of different impacts of intrusions. Third, at the same time, there is increased demand and competition for this fuel material, which are primarily rooted in drying of other sources of fuel. The fourth factor affecting fuel needs is the price-rise and short supply of commercial fuels (such as kerosene) in the local markets due to increased influx of migrant population in the area.

## **6.3 Impacts on People's Health and Their Medical Needs**

Apart from these impacts on satisfaction of major livelihoods needs, intrusions are found to affect local people in another significant way, affecting peoples' health and hence increased expenditure for medical needs. Local people, during interviews, made some revealing observations about impacts of various urban-industrial intrusions on their health (please refer to

Box 2). Some studies in the intrusion-affected areas of Konkan have pointed out that, due to various factors induced by intrusions (such as malnutrition, pollution, water-shortage), health of local people is adversely affected. It is also observed that, due to increased contact with outside world, new diseases and infections are affecting local population. All this has resulted into considerable increase in needs of medical services and medicines.

Unfortunately, these needs are not satisfied because of many reasons. First, health facilities and services provided by the government agencies continue to be inadequate and of low standard. Second, people in Konkan used to primarily rely on local medicines using surrounding natural resources especially from forests. However, due to various reasons, especially due to reduced availability of forest products, local medicines are in short supply or are simply not available. At the same time, there is severe erosion in the number of local/traditional medicine persons, their credibility, and availability of local medicines they use. Finally, doctors (often without appropriate training and necessary qualifications) practicing modern medicine charge very high fees and their medicines are also very expensive.

**Box 2: Observations by Local People on Impacts on Their Health.**

- Because of landfills, digging of quarries, long compound walls, embankments for railways, roads, and bridges, there is increased water logging in this high-rainfall region. This results in excessive increase in mosquito population. However, the government agencies continue to neglect anti-mosquito measures such as spraying of DDT. As a result, there is increased incidence of Malaria in local population. (This observation was made by people from all locations of intrusions visited).
- Air is always polluted, foul smell pervades in the entire area.
- Fish in polluted rivers and creeks gives out foul odor, and tastes differently. It also affects digestive system and causes reactions and skin-rash.
- Because of pollution of drinking water, children suffer from problems of digestive system and chronic cough. Many children suffer from rash and other skin problems.
- Across the region, people complain about increased expenditure on doctors and medicines. Many complained about excessive fees charged by the doctors. Responses of local people in the interviews and discussions suggest that on an average, a single visit to a doctor costs Rs. 100 to Rs. 125 at minimum, and, on an average, a family spends Rs. 500 per month on medicines and doctor.

## **6.4 Impacts on Cash-Income**

Finally, we come to impacts of intrusions on cash-income. For people who cannot obtain the necessary livelihoods support directly from local natural resources, cash income makes it possible to secure various goods for satisfaction of livelihoods needs. Two major source of

cash-income for rural families in Konkan (especially those who do not receive any income from 'white collar' secured jobs or business/trade) are: (a) sale of commodities produced or collected and (b) wage-labor. There are various processes/ factors at work that affect the cash-income of rural families. First, in intrusion affected areas, local people produce less and hence have less to offer for sale as agriculture, horticulture, fishing activities are affected. Second similarly, many families experience reduced availability of salable commodities, which could be collected from pastures, wastelands, and forestland. Third, in the case of artisan and other families undertaking the activity of service provision, there is reduced demand for the services they offer. Finally, cash-income from wage-labor activity is affected as opportunities for wage-labor are reduced due to impacts on agriculture and fishing, though in some pockets there is occasional spurt in employment availability.

## **7. Broad Indications and Future Work**

This is a qualitative study aimed at developing understanding and creating an overall picture and not to draw firm conclusions that could be generally applied. However, some trends and broad indications emerge from the findings of the study, some of which are discussed in this concluding section.

One of the important indications that emerge from the study is regarding the diversity in livelihoods strategies adopted by people. It appears that rural families in Konkan, depending upon their entitlements, available skills, and position in society, adopt different combinations of the five major livelihoods activities that could be undertaken in the region. The apparently complex figure (Figure 1) appearing in Section 2, which depicts the conceptual scheme of NRLP linkages, appears less complex when compared with this ground-reality.

Further, it appears from the study that the major source of disturbance in the NRLP linkages is the impacts on different types of lands. (This is not true obviously in the case of coastal or forest communities.) Further, it is observed during the study that local people, for their livelihoods, do not rely only on privately owned agricultural lands as is assumed by mainstream project agencies. Rather, to satisfy their livelihoods needs, local people draw from a variety of resources available from pasture, forest, and even wastelands that are publicly owned or are under community control. As a result, impacts of intrusions (such as acquisition, enclosure, or allotment) on publicly owned or community-controlled lands are also felt by a broader cross-section of people in the affected community.

A broad patterns of relationship between the type of intrusion and the affected 'resource-activity' linkages could also be discerned. These could be extended even to the next stage of livelihoods needs, which gets affected. For example, chemical processing industries tend to create water pollution on significant scale and affect 'water(bodies)—fishing' linkage. This, in

turn, affects satisfaction of two major needs—food and cash-income. Similarly, large petrochemical complexes require large tracts of lands, which are mostly acquired or purchased. This acquisition or sale of lands affects primarily the ‘land—agriculture’ linkages, which, in turn, affect satisfaction of not only food and cash needs but also even fodder, fuel, and drinking water needs of local people.

The most important outcome of this study is the deeper understanding about the NRLP linkages and impacts of intrusion on these linkages. This understanding could be summarized in terms of an outline of a framework—called NRLP framework. Such a framework would be able to fill the gap mentioned in the introductory section. The following are the major elements of this NRLP framework.

- The NRLP framework is founded on the understanding of the interconnections between the local natural resource system and local people, which are mediated through the livelihoods activities of local people.
- The urban-industrial systems, co-habituating with these rural communities, have diverse types of interactions with the NRLP linkages of these rural communities.
- When the urban-industrial system initiates an urban-industrial project or a development initiative (project or policy) in a rural area, the project or initiative affects the NRLP linkages in the area, primarily by consuming / affecting local natural resources, in direct or indirect manner.
- This stress on natural resources in rural areas often proves the proverbial last straw for the already stretched NRLP linkages in the areas. In short, such urban-industrial intrusions often prove disastrous for the overall livelihoods situation of members of the local rural communities.
- Thus, in the NRLP framework, industrial projects and development initiatives are viewed as intrusions into NRLP linkages affecting local ecological and economic systems and posing threat to the livelihoods of local rural people.
- In the NRLP framework, local natural resources are not viewed merely as sources of raw material or sinks for dumping waste. Rather, they are viewed as renewable sources of livelihoods, which are to be harvested sustainably and nurtured prudently.
- In the framework, local rural people are viewed, not as ignorant and irrational, but intelligent and rational members of human community having the first right over natural resources surrounding them.

- The framework views the site of project as a ‘locale’ shaping individual and social life, which, in turn, is shaped by socio-economic and cultural history of many generations.

Finally, coming to the suggestion for further work, this study was considered as the first stage study to be followed by a more detailed, quantitative study in the second stage. Though it would not be possible to elaborate on the design of the second-stage study at this juncture, some possible directions for future work could be discerned from the discussion in the previous sections. It is clear that the efforts made in this study need to be further strengthened by bringing in quantitative support. Bringing in data and numbers would not only facilitate drawing more definitive conclusions, but would also help decide the nature, magnitude, and the veracity of qualitative trends. This second-stage effort need not be restricted to mere quantification of the first-stage study. Rather, the second-stage study should take a broader focus. For example, it could also try to understand what impacts are felt at family level, rather than at community level (as in the case of NRLP focused study). The focus could further be expanded to see how impacts on NRLP linkages are passed on to the certain category of members of families, e.g., women, children, and elderly.

To sum up, it needs to be said that this study, though short and qualitative, provides a comprehensive and deeper understanding of how rural people and the natural resource system surrounding them are closely connected with each other through their activities conducted for securing survival and livelihoods needs. The study also shed light on how the infrastructure, urbanization, or industrialization projects affect these linkages between resource livelihoods activities and people, causing impacts on satisfaction of basic livelihoods needs of local people. The study also helped in evolving an outline of an appropriate framework to look at the ground reality in rural areas and impacts of external intrusion on various natural and social elements of this ground reality.

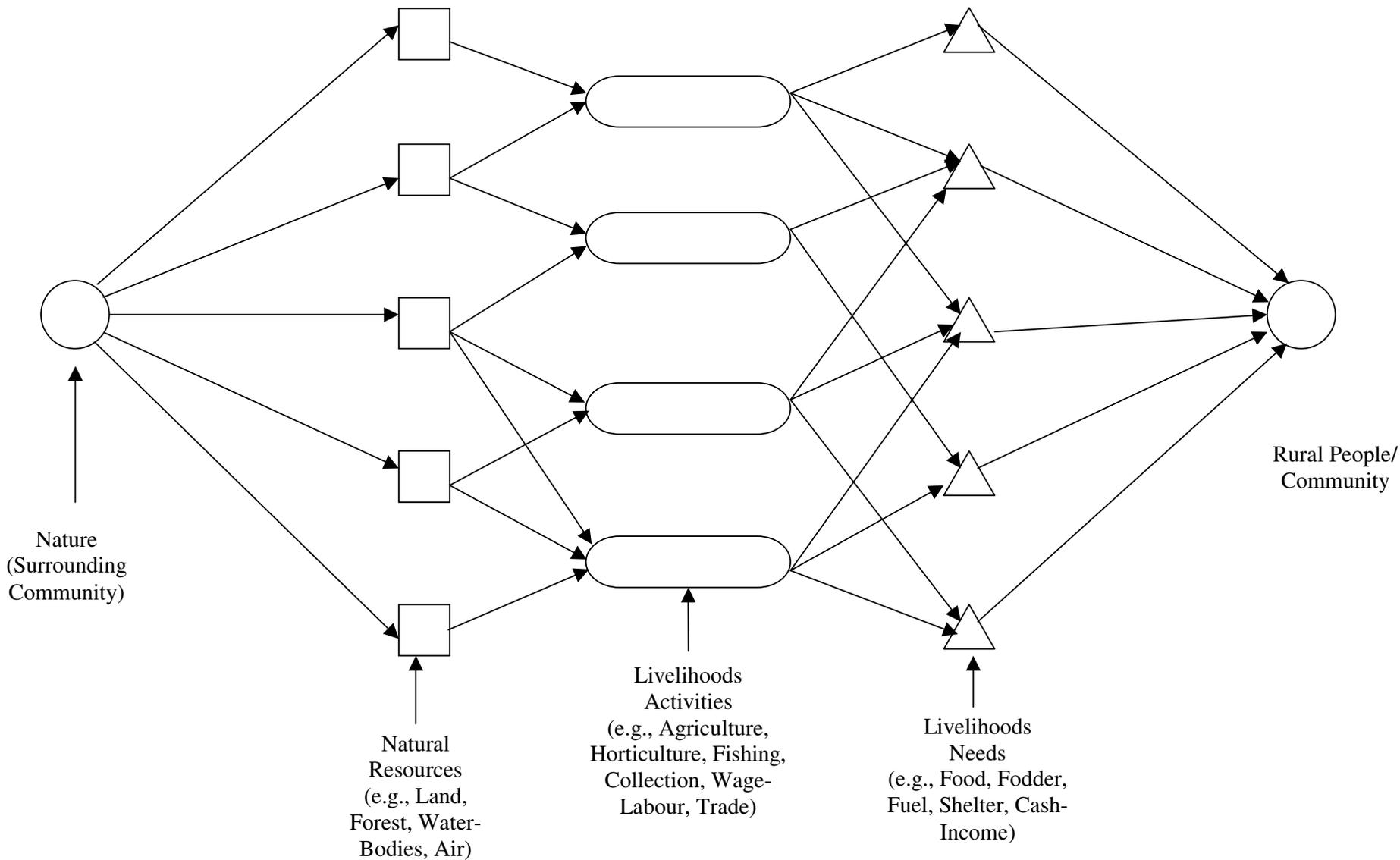
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**Table 4: Summary of Impact on ‘Resources—Activities’ Linkages**

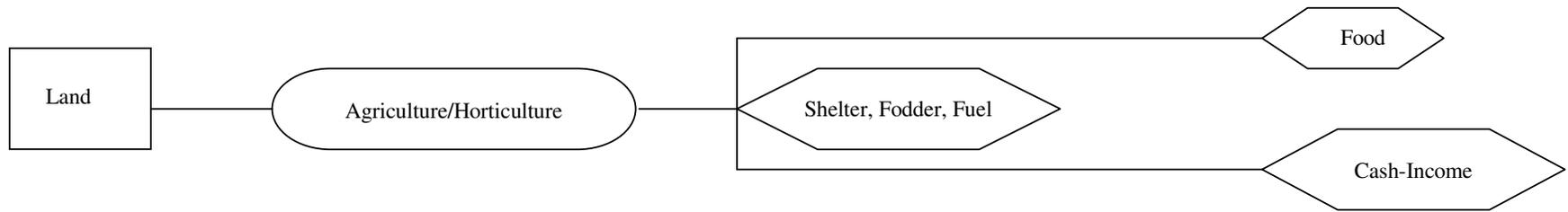
<b>Resources</b>	<b>Mechanism/ Process</b>	<b>Impact on Resource</b>	<b>Impact on Linked Activity</b>
Land	Acquisition of land  Sale of land  Chemical pollution  Flooding of land	Loss of ownership, control or access to (agricultural, pasture, waste, forest) land  Loss of productivity of land for varying degrees & for different periods  Temporary loss of productivity	Preemption or stoppage of agricultural / horticultural activities due to loss of control / access to land  Curtailment (qualitative / quantitative) of agricultural / horticultural activities due to curtailment of supply of necessary inputs  Loss of viability and loss of attraction of agricultural / horticultural activity  Loss of crop leading to further strain on already precarious livelihoods situation
Water-bodies	Chemical and thermal pollution  Increased traffic of heavy barges	Loss of productivity and regenerative capacity  Loss of access, productivity and regenerative capabilities	Loss of viability of fishing activity
Forests	Cutting/clearing of Forest  Submergence of forests Enclosure of Forests Increased Pressure on Forests	Disappearance (quantitative erosion) of forests  Loss of access to forest  Qualitative erosion of forests	Preemption of collection activity  Loss of availability & diversity in collectable material

**Table 5: Factors/ Processes Affecting Livelihoods Need: A Summary**

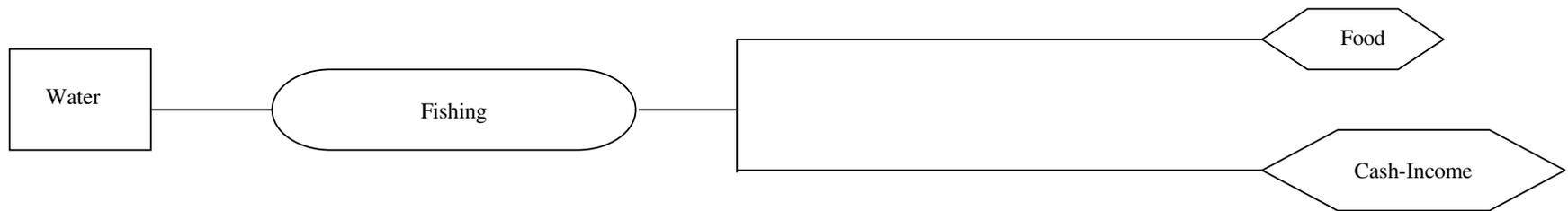
Impacted Need	Causative Factor/ Process
Food: Staple Food	<ul style="list-style-type: none"> <li>▪ Loss of Productivity/ Production of Grain crops</li> <li>▪ Increased sale of agricultural produce of the family</li> <li>▪ Reduced cash-income of the family</li> <li>▪ Increase in sale-price of grains</li> </ul>
Protein Support	<ul style="list-style-type: none"> <li>▪ Decrease in availability of good-quality fish</li> <li>▪ High prices of fish in local</li> <li>▪ Decreased production of pulses and oilseed</li> <li>▪ High prices of pulses and oilseeds</li> </ul>
Other Supplements	<ul style="list-style-type: none"> <li>▪ Reduced production of fruits and vegetables</li> <li>▪ Quality of fruits produced severely affected</li> </ul>
Drinking Water	<ul style="list-style-type: none"> <li>▪ Pollution of local water-bodies</li> <li>▪ Curtailing of access to sources of water</li> <li>▪ Malfunctioning or neglect of water-supply schemes</li> </ul>
Shelter, Fuel, Fodder	<ul style="list-style-type: none"> <li>▪ Availability / Access to biomass products from agriculture, pasture or forests curtailed/ reduced (timber, straw, seeds, grass, twigs, etc.)</li> <li>▪ Increase in relative prices (relative to cash-income) and short supply of commodities/ material to be purchased (kerosene, roof-tiles, etc.)</li> </ul>
Medical Needs	<ul style="list-style-type: none"> <li>▪ Increase in diseases and ill-health</li> <li>▪ Government facilities inadequate and low-quality</li> <li>▪ Reduction in availability and credibility of traditional medicines/ knowledge</li> <li>▪ High fees of doctors and high cost of modern medicine</li> </ul>
Cash-Income	<ul style="list-style-type: none"> <li>▪ Reduction in production/ collection of salable commodities</li> <li>▪ Reduction in opportunities of wage-labor</li> <li>▪ Reduction in demand for services/ products of local artisan</li> </ul>



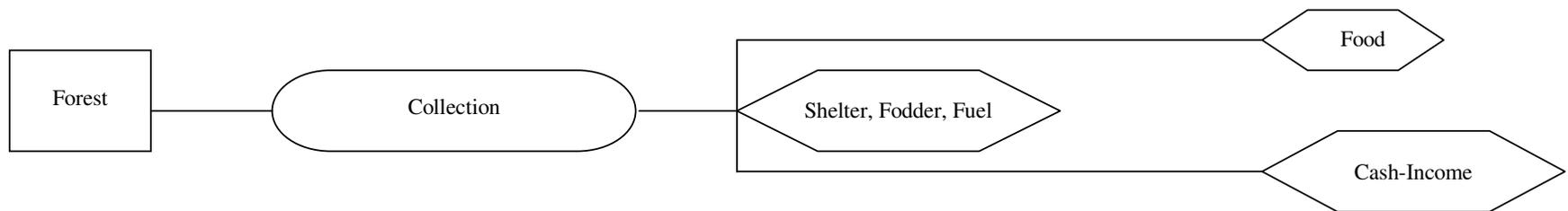
**Figure 1: Schematic Diagram of 'Natural Resource-Livelihoods Activities-People' (NRLP) Linkages in Rural Areas,**



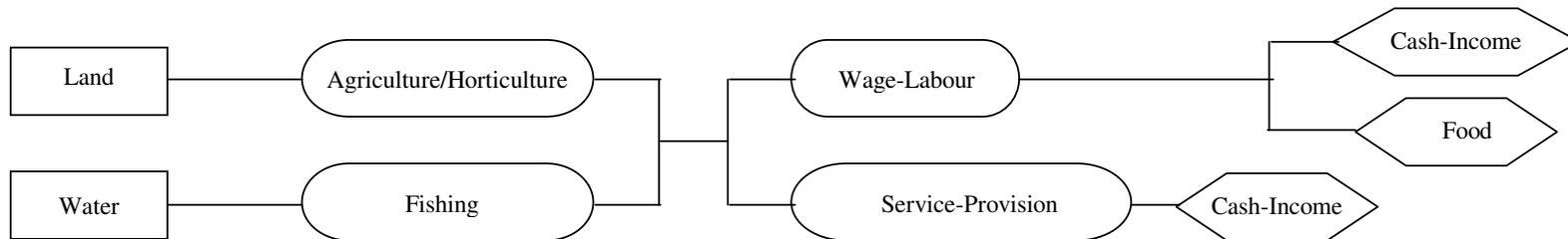
(I) "Land-Agriculture" Linkage



(II) "Water-Fishing" Linkage



(III) "Forest-Collection" Linkage



(IV) & (V) "Agriculture/Fishing" - to "Labour/Service" Linkage

**Figure 2: Resource-Activity Wise Natural Resource-Livelihoods Activities-People' (NRLP) Linkages in Rural Areas**