

Working Paper 364

**Ecological History of An
Ecosystem Under Pressure:
A Case of Bhitarkanika in
Odisha**

Subhashree Banerjee

ISBN 978-81-7791-220-3

© 2016, Copyright Reserved

The Institute for Social and Economic Change,
Bangalore

Institute for Social and Economic Change (ISEC) is engaged in interdisciplinary research in analytical and applied areas of the social sciences, encompassing diverse aspects of development. ISEC works with central, state and local governments as well as international agencies by undertaking systematic studies of resource potential, identifying factors influencing growth and examining measures for reducing poverty. The thrust areas of research include state and local economic policies, issues relating to sociological and demographic transition, environmental issues and fiscal, administrative and political decentralization and governance. It pursues fruitful contacts with other institutions and scholars devoted to social science research through collaborative research programmes, seminars, etc.

The Working Paper Series provides an opportunity for ISEC faculty, visiting fellows and PhD scholars to discuss their ideas and research work before publication and to get feedback from their peer group. Papers selected for publication in the series present empirical analyses and generally deal with wider issues of public policy at a sectoral, regional or national level. These working papers undergo review but typically do not present final research results, and constitute works in progress.

ECOLOGICAL HISTORY OF AN ECOSYSTEM UNDER PRESSURE: A CASE OF BHITARKANIKA IN ODISHA

Subhashree Banerjee*

Abstract

Ecosystem and Livelihood systems are dynamic in nature; their relationship being a product of centuries of synergetic evolution that continues into the current scenario. This historical emergence is shaped by various stakeholders and by the prevalent societal rules and norms. Therefore, in order to understand this "symbiotic" concept and its emergence from an historic point of view, we have focussed on forests and forest dwellers as two inseparable components. This article is based on both primary (oral history) and secondary (archives and books) sources for understanding the changing roles of both the system and how it has evolved over time. By taking a case study (of Bhitarkanika forest), the author tries to put in light the details about the various dynamics of the systems in the process of this change. History tells us that there has been a tremendous mismanagement of resources in Bhitarkanika along with an increase in population. Though the declaration of National Park and restriction on the entry and exist proved to be a boon for conservation purpose, the task of reversing the population pressure on National Park still needs to be addressed.

Introduction

Ecosystem¹ and Livelihood² systems are both dynamic in nature and their relationship has evolved over the centuries. The present scenario of both the systems has emerged from a long historical background. This historical emergence is shaped by various stakeholders like the State, markets, existing societal rules and norms. Therefore, in order to understand this dynamic concept we have taken up forest and forest dwellers, otherwise called vana and atavika respectively, as two inseparable components. This helps us to understand the emergence of the systems (both ecosystem and livelihood systems) historically.

The livelihood of forest dwellers depends on the forest and forest products. Since it is a question of livelihood, the historic emergence of livelihood influences the relationship between forest dwellers and the forest ecosystems. Utilisation of ecosystem services³ is manoeuvred and monitored by the changes in livelihood systems. These changes in the livelihood systems are in turn impacted by two important institutions, namely, the State and the market. State assumes strong regulatory powers whereas the markets shape the utilisation patterns of the ecosystem services. Earlier, largely the forest dwellers had the freedom to decide the use rate and the rates of reclamation. However, historical

* Research Scholar, Institute for Social and Economic Change, Bangalore - 560 072, India. E-mail: subhashree@isec.ac.in; subhashreecds@gmail.com.

This study is a part of my PhD thesis at ISEC; I thank my supervisor Dr Syed Ajmal Pasha, Doctoral Committee members (Prof M V Nadkarni, Prof R S Deshpande, Prof M G Chandranth and Ms B P Vani), Panel Experts and other esteemed referees for their valuable comments and support.

¹ Defined as a dynamic complex of plant, animal, and microorganism communities and the nonliving environment interacting as a functional unit" (Millennium Ecosystem Assessment 2005)

² Livelihood as defined by Ellis (1998,1999) and further modified by the author as a system that encompasses income, both cash and kind, access to services and benefits from ecosystems (outside the market framework) and social institutions, gender relations and property rights required to support and sustain a given standard of living.

³ Functions of nature served to human societies (King, 1966; Odum and Odum, 1972 as cited in Gómez-Baggethun, Groot, Lomas, and Montes 2010)

evidence suggests that this interactive system caused over-exploitation and the market created in the vicinity as well as in the wider economy increased the rate of exploitation of the forest and forest products. These also shaped the livelihood system from within as well as strengthened the market. Moreover, the new commercial forces changed the livelihood system of the people who depended on the forest as the major livelihood supply.

In this regard, it is essential to understand the relationship between the two systems with the help of a case study (Bhitarkanika forest) so that we can understand in details about the various dynamics of the systems in the process of this change. With the help of socio-ecological systems (SES) approach we can understand the historical interdependency of the whole system. The term SES is used to refer *"to the subset of social systems in which some of the interdependent relationships among humans are mediated through interactions with biophysical and non-human biological units"* (Anderes *et al*, 2004). For example, when one fisherman's actions change the outcomes of another fisherman action (through the interacting biophysical and non-human biological units that constitute the dynamic, living fish stock.). The Classic studies by Gordon (1954) and Hardin (1968) presumed that without private ownership by individuals or a governmental unit, the temptation to overharvest and to take a free ride on public goods would lead to the destruction of the resources. In 1980s, it was the property rights solution that persisted as a method of choice for solving common-pool resource dilemmas, one of the possible dilemmas that resource users may experience in SESs. Scholars disagreed, however, on whether this was private or government ownership.

There are a variety of strategic factors that may influence the interaction between resource users, different institutions and resources. It is important, however, to understand these interactions and how these interactions and strategies affect the long-term relationships. Therefore, an historical overview is taken here to analyse the emergence of the relationship between the forest dwellers and the forest ecosystem.

Methodology

This study includes both primary and secondary data to understand the overall change in ecosystem of Gahirimatha and Bhitarkanika National Park in Kendrapara district, Odisha. The secondary sources include data from Archaeological Department, Forest department and various published and unpublished sources of literature. The primary survey includes four villages (Dangamala, Iswarpur, Satabhaya and Vetka) nestled on the fringes of the National Park. Three separate and distinct structured questionnaires were prepared for our field work, i.e., for household level, village level and senior citizens to collect data and information from different households, communities and other stakeholders. These three questionnaires help us to understand the various issues and problems that are faced by the people in the region. Four Focused Group Discussions (FGD) were also conducted to collect information on various socio-economic-institutional aspects of the region on a spatial scale. A sample survey of randomly selected 165 households (out of the total of 668 households), 40 senior citizens and four village level data were collected. The survey was conducted, during the periods from April to May 2013, April to May 2014 and October to November 2014.

An historical analysis is done in order to understand how different resource users interact within a particular set of institutions resulting in use and abuse of resources. It is through the historical analysis that one can find answers to the various problems that are associated with both the ecosystem and livelihood systems and can explain the difference between sustainable and unsustainable resource management.

Threats to the Ecosystem

According to the Forest Survey of India (FSI), 1999, the total coverage of mangrove forest was 184 sq km, which increased to 217 sq km in 2001 and then started gradually declining to 183 sq km in 2013 and slightly increased to 190 sq km in 2015. This is mostly due to the increase in population in the region. According to the Census, in 1991, there were only 309 villages with 118,939 people, however, in 2011, there were 310 villages with 145,301 people in Bhitarkanika National Park, covering 672 sq km, which means a density of 216 persons per sq km⁴; i.e. for a National Park this is quite a high density of population. This growth in population has put a tremendous pressure on the fragile ecosystem. However, the coverage of dense forest has remained almost constant in the past decade. It was 81 sq km in 2009 and in 2015 it was 82 sq km. This is mostly due to the ban of entry into the forest.

In the recent past it has been seen that the ecosystem is facing a severe threat caused both by natural and man-made conditions. The use of chemicals and pesticides in prawn *gherries*, has negative impact on the agriculture and wildlife depending on the aquatic habitats. Continuous sea erosion (due to sea level rise), salinization of soil affecting the agricultural production, mangrove degradation (Chadha and Kar 1998; Jagtap *et al* 1993; Mohanty *et al* 2008; Badola *et al* 2012), threats to biodiversity (Chadha and Kar 1998; APOWA Report 2010) and increase in the frequency of extreme events like flood and droughts (Mohanty *et al* 2008) have further added to the problem. Further, according to the villagers, *Hentala* (local name in Oriya) for Phoenix Paludosa Roxb, is the most important mangrove species in the region which has declined over the period. This species is mostly used by the household for ropes, fencing, fruits, thatching house, poles for constructing houses, fuel wood and broom sticks. Ironically, after the banning of entry to the forest this species is slowly disappearing. The people explain that the species re-grows when periodically cut, and may tend to vanish if not used, though it must be used sustainably not recklessly. This is a perfect example of how social systems and ecology interact with each other.

To understand the present situation, it is important to delve deeper into the history of this region and analyse the root causes behind the present problems that beset the system, and see how the present situation came about. I have divided the historical period into five spans/phases – Ancient India, Pre-British era, British regime, Independent India, and post-declaration of Sanctuary in Bhitarkanika – to trace the links between the ecosystem and livelihood of the people residing in this region over the course of time.

⁴ For India the population density for 2011 was 382 persons per sq km and for Odisha it was 269 persons per sq km.

Ancient India

The ecological landscape of Odisha⁵ and India at large has seen many changes with the passage of time. Our age-old hymns, religious rituals, folklores, stories, epics, narratives, give us a vivid picture of what it was during the ancient times and how changes have occurred. From the classic epic of Ramayana by Valmiki to the Tamil literature of the Sangam period, from Kautilya's *Arthashastra* to Faizal's *Ain-i-Akbari*, from the colonial times to the Independence period, one can witness the tremendous change in the ecological space of India and its impact on the people's livelihood residing in this region.

The forest resources of Odisha were so vast that it was an arduous challenge for the rulers to manage and govern them: large numbers of wild beasts along with high density, thus making many regions virtually inaccessible. Nevertheless, these forests were a source of revenue to many of the rulers / administrators. Kautilya's *Arthashastra* (Rangarajan 1992) describes how no one was permitted to cut any parts of the forest without seeking the prior permission of the State. This was not done with any altruistic notion of forest conservation but rather to get economic benefit from the forest resources. Neither the Raja nor the forest dwellers bothered about preserving this resource as it was just more than enough in many areas and the need for forest conservation did not arise. The attitude of the Rajas towards their forests was mostly revenue-oriented.

It is interesting to note here that the perception of forests also changed from time to time and sometimes it was perceived differently by different parties of different interests at the same time. For example, in the Ramayana and many other folklores, forest is considered as a place full of dangers and demons and at the same time it is romanticized with its beauty that ought to be enjoyed (Thapar 2010, Rangarajan 2010). But with the increasing demand for the land for agriculture and civilization, the perception of forests changed with the intention of enlarging kingdoms. For instance, in the epic Mahabharat, Arjuna⁶ cleared the forest of Khandava vana to provide land for agricultural/pastoralist clan and to build the capital city of *Indraprastha*.

The forests of ancient India were used for other activities as well, such as hunting, hermitage and as a place of exile (Thapar 2001). It was also considered as a place of worship, where certain trees were considered sacred and was therefore protected. Due to the abundance of forest, forest animals thrived, as evident from the Chinese traveller Hieun-Tsang, who during the seventh century referred to the immense forest cover in India which made his travel more difficult (Rangarajan 2010). The forest was used for recreational purpose of hunting wild animals. Hunting was also a symbolic representation of kingly conquest over the forest. Further, according to Hindus, the life of an individual is divided into four stages namely, Brahmacharya, Grihastha, Vanaprastha and Sanyasa. The last two stages include renouncing of the world and going to the forest in order to seek truth and knowledge. Thus, forest was considered for asceticism and renunciation. A place which is far away from the civilization and can be used for seeking knowledge through isolation and meditation and finally a place where one can contemplate on the meaning of life and its purpose (*ibid*).

⁵ In ancient India Odisha was known as Kalinga

⁶ The third among Pandavas, in the epic Mahabharat

It was during the Mauryan period that the forest was divided into three kinds – forest for recreational use such as hunting, forest for economical use such as timber etc., forest for elephants, where wild elephants could be captured⁷. Special areas were also allocated for ascetics and schools for Brahmins in the forest by the government (Rangarajan 1992). The aim was one of conserving the forest for the King's economic benefits and also providing forest-related livelihood for the people. The revenue from forest and land cleared from cultivation was solely controlled by the State (Thapar 2001, 2010), indicating the State's autonomous power over the forest and its products.

Further, regimes like those of the Kushanas and the Mauryas in the north, the Chalukyas and the Sangam Cholas of the peninsula indulged in vigorous trade both internal as well as overseas (Gadgil and Guha 2013). This led to an extension of cultivation of land and increase in irrigation of the State, bringing more and more forest land in use. Further, this also led to the colonization of Kalinga, in an attempt to expand the Mauryan empire. Kalinga/Odisha during this period was rich in forest and forest products. Most of its land was under forest cover and most of the people were tribals or forest dwellers. In *Arthashastra* (Rangarajan1992), the forest tribes were looked upon with great suspicion and they were sought to be controlled through bribery and political suppression. It was common to see that the people, who lived in the villages, that is, the civilized world, looked down upon the people who lived in or near the forests. This was so since the village/grama was evolved out of the unity of the group which was maintained by social rules called dharma encapsulated in the ritual of sacrifice (Thapar 2001), but the atavikas/forest dwellers lacked the unity of the group and were not guided by the social rules or dharma. Forest was also considered a place for demons or *Rakshasas*. Thus, the grama/civilised settlers frowned upon the lifestyle of the people residing in and around the forest.

Other than benefits from elephants, the rulers derived revenue from Pasuvana (deer forest), Mrigavana (game forest), Dravyavana (productive forest). The productive forest includes materials like hardwood, bamboo, creepers and medicinal plants. Tiger and loin skin was also claimed by the rulers. Apart from the above-mentioned forest products, forest dwellers were very much dependent on the forest for making rope, leaves used for writing purpose, flowers for extracting colour materials, etc. The State played an important role of controlling the forest and forest product and in some areas as mentioned above, this led to sustainable management of the resources. However, the policies of the State were purely market-driven. As there was an increase in trade both internally and overseas, the State wanted to expand its wealth and increase its military power so that it can colonize other states. Thus, the forest policy during those times was an important aspect of the State. This led to sometimes over-exploitation of certain resources and also debarring of forest dwellers from the use of it leading to complications in their livelihood. But it does not seem that the scope for commercial exploitation of forests could have been quite high in those days. Also, inaccessibility to the forest must have adversely affected any such possibility causing the amount of revenue generated to be quite small.

⁷ This was so because elephants were easier to catch than to breed as they have longer gestation period of 20 months and it was difficult to rear the calves. Elephants were of many uses as in wars; their ivory was very expensive, being signs of status. They served as mobile platforms to hunt in tall grass country (Rangarajan 2010) and were also used in the temples for different religious needs. Apart from the above-mentioned uses, elephants were also hunted for meat in the north-eastern provinces of Mizoram, Nagaland and Arunachal Pradesh (Gadgil and Guha 2013). The Mauryan kings banned the killing of elephants for eating purpose; the tusks of the dead animals were to be handed to the government (Arthashastra 1992). The punishment was severe (sometimes death penalty) for the people who did not obey the government.

Pre-British Era

Historically Bhitarkanika belongs to the Kanika Raja. A brochure issued by the Kanika family indicates that around 1280 AD a brother of the ruling chief of Mayurbhanj, named Bhujabal Bhanj, came over to this region and gradually established himself and extended his domain from Chhamuka area to Kaldwip (presently in Rajnagar) through his political acumen and matrimonial alliance. Righagarh was then the headquarters of Kanika Raj for about five to six hundred years (Chadha and Kar 1998).

The era of foreign invasion of Odisha started with the Afghans who ruled for eight years from 1568-1576 AD. But in 1576 AD, Odisha was annexed to the Mughal empire by Akbar. The Mughals divided Odisha into two parts: the Garjhats or killajats was under the Oriya Chiefs who agreed to pay annual rent and remaining area called Mughalbandi was under the direct administration of the Mughals. The Kanika Raja falls under the Garjhats category. As the Mughals remained busy in war, they created a class of intermediaries or Zamindaries who used to act on their behalf and the jungle of Bhitarkanika was ruled by them. With the death of Aurangzeb in 1707, the Mughal empire began to collapse. Taking advantage of this, the Marathas were the next in line to rule Odisha in 1751.

The Estates of Kanika was no different from the rest of India. It was a State with strong forest policy to boost up the economy. As per Hunter, ± Rs 65011 a year (Hunter 1872 as in Rath 2005) was collected as rents from the extensive grazing and breeding grounds stretching to the Sundarban and marine jungles (their gross revenue at that time being about ± Rs 19000). Revenue from forests increased gradually in the 19th century giving a boost to the revenue-oriented forest policy. And Hunter said that petty alienations of waste – or jungle land were another source of some of the land holders' income (*ibid*).

Apart from revenue, the policies of the forest were defence-oriented. From east to west and north to south, it had been the policy of the Rajas of Odisha to make use of forests for defence purpose. Bamboos and other plants were planted to keep off the foreign invasion. For example:

"An Old man explained to me that the jungle had been planted to keep off the Marhatta Horses." (Hunter 1872 as in Rath 2005)

Forest animals were also used in wars: like elephants captured from the jungle were trained and used in warfare. Further, the kings also used the forest for agriculture purpose. Though the major part of the Kanika land comprised forest lands, the general tendency of the Rajas was to encourage cultivation so as to introduce a civilised way of living in their States. Also, agricultural produce, especially paddy, was of commercial importance in the system of revenue assessment for centuries. The tribals were mostly engaged in temporary (shifting) cultivation which resulted in mass clearing of forest and their dependency on forest was more than mere agricultural. Tanks and reservoirs had been the credit of many Rajas for centuries, for it was considered to be a pious act. Still, demands for irrigation could not be met completely. It is natural to expect that agriculture was more important than forests in the Garjats like anywhere else and as such, people were encouraged to reclaim forest lands.

The forests were also used for plantation of certain species like mango, jackfruit and coconut. Roadside plantations were the credit of many Rajas for centuries and these were thought to be of spiritual value.

Another important reason for forest management was for recreations. The Rajas favoured the forests for one of their favourite pastimes, i.e., *Shikar* or *Mrugaya* (*hunting*). For example, in Kalidasa's famous play, *Shakuntalam*, the king hunts many families of tiger and elephants for the sake of recreation (Rangarajan 2010). It can be accepted without any doubt that the Rajas would not tolerate, unless something special had happened, that the forest cover of their States be totally destroyed and no scope remains for the royal gaming.

Finally, the forest was an asset to the State as part of trade and commerce. Forests were also an important source of inputs for exporting products. For example, tassar and lac, along with other forest products, were exported to the Mogulbandi areas from the Garjats in exchange of salt etc. Wax, honey, timber, firewood were among the important articles of forest trade. Even during 4th century BC, an important trade of Odisha was that of the elephants (Gait 1928).

Interestingly, in spite of such a background, there still existed certain restrictions which acted as a blessing for the conservation of forest which either directly or indirectly helped in management and conservation of this natural resource to some extent. For example, extraction of herbs from places like temple yards, roads, funeral ground and wells, was prohibited (Mathan 1989 as in Rath 2005). Similarly, plantations meant for community purpose, especially those raised for temples, were believed to be sacred and there was a belief that if somebody caused harm to these trees or cut them, he/she would have a disastrous fate. Thus a kind of reserved land and reserved species were created. Further, an ancient Oriya manuscript on *Vastu* prohibited the use of species like Dhaba, Mahanimba, Jeuta, Khaira, Tentuli, Sunari, Jamun, Kaitha, Kadamba, Nimba, Khajuri, Bahada, Palasha, Harida, Shimuli, Gaba, etc., for house constructions (Moharana 1995 as in Rath 2005). It was seen that after the famous Kalinga war, Ashoka became a follower of Buddhism and started laying much emphasis on environment and forest. He raised many roadside plantations, ordered to stop killing of certain faunal species even for his own royal lunch. He also asked the people to prevent forest fires and resultant destruction of many living organisms and prohibited elephant catching operations on specified days.

However, during each of their time, the State personalities changed along with the change of power. For example, Afghans were intruding visitors who took along with them whatever was possible both in terms of forest and non-forest products. On the other hand, Marathas were settlers and they settled in Odisha. The objective of the State changed along with the change in the power of the State and so were the forest and the natural resources (this is explained in detail in Table 2).

British Regime

The British were next to rule Odisha and their interest was exploitative. They tried to get the possession of Odisha by peaceful means but failed. It was Lord Wellesly who solved the problem by forcefully conquering Odisha and crushing the Marathas during the second Anglo Maratha conflict on August 3, 1803. The Raja of Kanika executed an agreement with the East India Company on November 22, 1803 along with other chiefs and received acknowledgment of his rights to hold the Estate by paying annual rent. As per the treaty, the Raja of Kanika was supposed to pay a fixed rent to the British and remain loyal to them. In return, the British would not interfere in the internal affairs of the estate (Chadha and Kar 1998).

Seven rulers (Balabhadra Bhanj, Jagannath Bhanj, Harihar Bhanj, Binayak Bhanj, Tribikram Bhanj, Padmanabh Bhanj and lastly Rajendra Narayan Bhanjdeo) ruled Kanika after the British conquest. The welfare of the state was mainly at the mercy of the Rajas because the British did not bother how the rulers managed the estates. All that the British were concerned about was the annual tribute that the Raja agreed to pay to their Queen.

During this time, Bhitarkanika was known for its very dense forest and was believed to be very rich in both flora and fauna. This forest was named Bhitarkanika (meaning interior Kanika) due to its inaccessibility. It had a wide range of the mangroves and was home to many wild animals like leopards, porcupines, deer, crocodile, boar etc. "Crocodiles and Gharials or fish-eating alligators abound in the tidal rivers and creeks and grow to a very large size. The man-eating crocodiles annually lavish a heavy toll on cattle and human life" (Bihar and Orissa District Gazetteer 1933 as in Das 2003). There were also innumerable river channels and creeks present inside the forest area. Unfortunately, now there are no more leopards found in this region as most of the leopards became victims of the hunting practises by the then Rajas. The people residing in the region mostly depended on agriculture, hunting and fishing for their livelihood. The Adivasis of the region were also involved in activities like honey and wax collecting, basket weaving.

In 1872, the Superintendent of Tributary Mahals, Odisha conveyed his concern to the Garjat Chiefs over the destruction and lack of systematic management of their forest and urged the Rajas to take appropriate action (Rath 2005). The demand for forest and its products made the administrators more and more cautious about the exploitation of forests. Hence forests now assumed an important place which was hardly realised before by the people and their rulers.

With this started the scientific management of forests by the British administrators during the latter half of the 19th century, when they showed interest in forest conservation for revenue collection and also to achieve administrative perfection. The Rajas were the next (late 19th or early 20th century) who were interested either due to direct influence and intervention of the British, or because of some economic intention.

The States started introducing legislation based on forest laws of the British-ruled areas. The first forest act was passed by the Governor-General of India in Council, in 1865 (Act no. VII) and it was known as the Indian Forest Act.

This Act empowered the British to form government forest by notification from any wasteland or any other land covered with trees. It was replaced by the Indian Forest Act in 1878, which included provisions for settlement and admitting of the rights and privileges of people, and classified the forest into three types - Reserved Forests, Protected Forests and Village Forests. The 1878 Act was replaced in 1927 by a new Indian Forest Act which remains in force till today.

Almost all of the princely states had their own forest acts or rules based either on the Indian Forest Act, 1927 or the Madras Forest Act (Madras Act no. V of 1882), 1882. Kanika was reserved under the Indian Forest Act, 1927. As per the Government instructions, the Rajas followed this policy according to their own interest and local conditions, and as such, the policy was implemented in three different ways - strict in restrictions regarding the access to the forest, liberal in concessions for certain people and finally for various development projects. It was seen that in the mid-20th century, the

revenues of forests were influenced mostly due to factors like railway demands, accessibility to bigger markets, war supply, and industrial demands.

However, in Kanika, the system of forest management was somewhat different in many respects from that of the feudatory States. For example, the King demarcated the forest into three categories – the first category was the pure forest (Atak Jungle), then the protected forest (Rakshit Jungle) and finally the remainder forest (Chhada Jungle) which are discussed below:

- Atak Jungle Blocks (Class I): These included the interior areas falling under six different blocks. They were Kalibhanjdian, Bhitarkanika, Thakurdian, Banipahi, Kantiakhai and Gahirimatha forest areas. There was no permission either to cut trees or kill animals or to collect forest produce from these forest blocks. Severe punishment was given to people who disobeyed the rule.
- Rakshit Jungle Blocks (Class II): There were 18 Rakshit Jungle Blocks These were East of Dhamra, Tikayat Nagar, Rajendrapur, Eastern side of Narayanpur, South of Mahisamda, North of Mahisamda, North of Brahmabara, Sagunachera, Baguillidia, North of Habalaganda, Sunei-Rupe forest, Ranahansua forest, Baunsagarh forest, Satabhaya, Barahipur, etc. These forests were managed on a rotational basis. Permits for collection of specific forest produce was issued by the officers of the King to the local inhabitants.
- Chhada Jungle Blocks (Class III): All forest areas other than the "Atak" or "Rakshit" jungle blocks belonged to this category. People had full accessibility to this region and were allowed to collect any necessary product needed for their livelihood from this Class III forests (Government of Kanika 1928, Chadha and Kar 1998).

This classification was done to maintain a proper forest and at the same time safeguard the livelihood of the people. 29 forest blocks were surveyed and demarcated by the King and the Zamindars. The people residing in this region were allowed to collect firewood or other requirements from the Class II and Class III forest (yearly rotation of blocks was followed for using forest products) only after making due payment to the king. Every year only two blocks were allowed to the villagers and those blocks were called "Chhada Jungle" for that year. The Rajas issued a *patta* for the villages at the rate of Rs 15 per year. This enabled the people to get access to the forest and its products. Each year one block of forest was cleaned and then the next block was used in the next year. Different blocks were opened and closed in rotation and people had to collect their requirements from the opened blocks. This continued until the 22nd or 23rd year and then again the first ward was chosen⁸. This helped the forest to grow and the people to survive. Further, in 1916, the King introduced the *Bana Kara* (Forest Tax) which amounted to a total of 64 taxes along with the general taxes, putting severe burden on the people residing in this region (Panigrahi, Nayak and Mishra 1998). Fortunately, there are no taxes anymore but the activities are also banned and deemed illegal.

The forest rules were very strict in order to control overexploitation of the resources. Prices were fixed for every forest product and even the type of trees to be cut for different purposes was pre-decided by the king. This was so because by this time, forest became an important aspect of revenue generation and therefore it was no longer provided to the people as a free gift of nature. There were

⁸ Forty interview with author, 2013 and 2014, Dangamala, Iswarpur, Satabhaya and Vetka, Rajanagar Block, Odisha (tape recording and handwritten notes in possession of the author).

also reserve species of trees that nobody was allowed to cut or damage. Similarly, strict rules were followed for illegal poaching of animals and there were reserve animals that nobody was allowed to touch. Rule breakers and intruders were heavily punished by cancellation of their permission to enter the forest for a few years, by taking away the entire forest product collected by them and even by harsh physical punishment (Government of Kanika 1928). People were so scared of the king that if any forest animal, by mistake, entered any village, the villagers immediately informed the officers of the king.

Raja revised the forest cess of 0.80 *paise* and introduced a new rate at 6 *paise* per mahana⁹ as rent which was collected from all Ryots indiscriminately. The tenants were against this revision and the settlement authorities pointed out its unfairness to the people. So the Raja decided in 1928 to go back to the old system (i.e. 0.80), but also ordered to reduce the quantity of firewood allowed against the cess from 100 mahana to 50 mahana. And timber for house-building purpose was no more allowed. Wood or logs for the following agricultural implements were granted:

Agricultural Equipments

<i>Nanga</i> (plough)	2 pieces
<i>Kanti</i>	2 pieces
<i>Isa</i>	2 pieces
<i>Juali</i>	1 piece

Source: Rath 2005

Through all the acts and laws the people in the Kanika zamindari were being variously exploited by the ruler. Relationship between the Raja and the tenants was worse even during the 1930s and though the ruler announced certain concessions in 1937, the tenants considered it inadequate. The Zamindars charged a fee of 0.80 *paisa* for each buffalo per annum in the unreserved forest and a nominal royalty was charged on eggs of the sea turtles. A separate forest pass (permit) was given to the tenants known as the "*pahi pass*", those were from outside the estates had to pay an annual fee of Rs 2 as compared to 0.80 *paisa* for the locals in order to access the forest for their daily needs (Panigrahi, Nayak and Mishra 1998). This fee was realised either annually (forest cess) or immediately (schedule of rate); and the modes of payment were three, viz., in cash, in kind, or in labour (*beth*), i.e., thatching the royal / State buildings etc.

The other tax levied on the people was the "munga pass", or the boat pass. As there were no roads in this region until as recent as 2013, people had to travel through rivers and creeks. An annual fee of Rs 3.15 and 4.20 was charged for locals and outsiders respectively by the king for allowing them to ferry their boats in the river. Similarly, "trade pass" was also levied upon the people annually for trading in this region for an amount of Rs 3 and Rs 4 for locals and outsiders respectively (*ibid*).

The rulers of this Estate seem to have realised the ecological significance of the mangroves at least a few decades before the Estate abolition: besides having a strict regulation for their forest resources, they did not allow Hental (one of the most important mangrove species) to be cut for

⁹ 1 mahana = 40 kg

domestic or agricultural purposes though it was considered to be very useful for house building etc. Only leaves (*pincha*) of this plant were allowed in specified quantity for roofing purposes (Mohanty 1992 as in Rath 2005). Restrictions were also levied upon the forest dwellers for hunting of species especially female deer, peacock, to ensure that their number should not decline in the forest region. Also, some of the coastal forest tracts were either reserved or protected. However, in the late 1940s, the zamindars leased out extensive forest areas to people even from outside Odisha due to fear of losing land and money. Immigration of Bengali people to the coastal areas of Kujang and Kanika etc. adversely affected the forest resources. Besides encroachment, a kind of native reclamation known as '*Kandha Chasa*' or '*Pahi Chasa*' has also damaged the forests areas.

After Independence, the provincial State merged with the Indian Union. The then Raja in order to earn quick revenue, sent a messengers to Kanthi in Medinipur, West Bengal region to sell their land to Bengalis at Rs 5 per acre. People started pouring in and the only condition that was followed was that the Bengalis had to clear the forest and pay Rs 5 per acre and could own the land. The huge number of Bengalis found in this region is all due to this sale of land at a cheap rate by the Raja himself¹⁰.

Independent India

Bhitarkanika was under the control of the Zamindari forests of Kanika Raj till November 26, 1951. With the abolition of the Zamindari system in 1951, the jurisdiction of these forests passed on to the Revenue Department of the government of Odisha from 1952 to 1957. The Local Authorities of the Government or the *Anchal Sassan* which falls under the Revenue Department continued to give the rights and privileges to the tenants as during the zamindari period. The zamindari schedule of rates continued to exist and the Anchal Sassan granted various lease to tenants on forest products during this period. On November 15, 1957 it got transferred to the Forest Division and finally, to the Wild Life Division in 1980-81.

After the Rajas, the revenue and the forest departments took over the charge and continued as per "Kanika Raj Jungle Mahal Niyamabali, 1935" (revised on July 3, 1951), with the *patta or passes* system that was still continuing. The classification of the forest continued as before and the forest was divided into three zones. The villagers were given *pattas* and they used to take forest products that were necessary for their family and for their livelihood sustenance. The forest goods included tree (felled, dead and dried), fruit, leaves, tree bark, coal, salt, grass (herb – Bahumuruga, Keuti, Nalia), honey and wax, wildlife, horn, skin, bone, feathers, shell and other goods being produced in the forest and will be produced in future. *Pattas* or passes were given to the people for collecting firewood, agriculture appliances, thatching accessories from forest after depositing Rs 16 annually.

Pattas or Passes were also given to people who had buffaloes and other livestock for grazing inside the forest. Those who had buffaloes were allowed to graze in the Class III forest and had to pay 50 paise a year per buffalo and a road tax of - 25 paise and those who wanted to graze in Class II forest had to seek permission from forest officers and had to pay 10 paise and road tax of 5 paise per year per buffalo. Hunting was also permitted to the people by the forest department but they had to

¹⁰ Forty interview with author, 2013 and 2014, Dangamala, Iswarpur, Satabhaya and Vetka, Rajanagar Block, Odisha (tape recording and handwritten notes in possession of the author).

pay for such activities. For example, in order to hunt birds only, Rs 7 was to be paid per year by the individual, for those hunting bear only, Rs 15 per year, for boar, leopard, crocodile and deer, it was Rs 7.50 per one beast. This hunting was only allowed in Class II and Class III forests. Further, birds and bear hunting passes were only given to residents of the area only and for hunting the other animals separate passes were given to both outsiders as well as insiders. However, hunting of leopard, peacock, wild cocks and birds like titter, pregnant deers was prohibited in the region (Chadha and Kar 1998).

Pattas were given to fishermen (*Jaliya Praja*) for fishing and cutting wood for preparing boat and net. Pattas were also given for cultivating in forest land, collecting coal, sewn wood for cowshed etc. The villagers had to depend on this pattas or passes to use the forest products for their sustenance. On October 4, 1961, a notification concerning the reservation of trees in the protected forests in the ex-zamindari areas of Kanika was passed and important trees like Sundari (*Heritiera minor*), Hental (*Pheonix Paludosa*) etc were reserved in the protected forests in the Kanika range as they were gradually disappearing (*ibid*). This led to unrest among the people of Bhitarkanika as these were the two most important trees used for different purposes in their survival. Further, Section 30 (c) of the Indian Forest Act, 1927 (Act XVI of 1927) banned the quarrying of stone, burning of lime and charcoal, collection or subjection to any manufacturing process or removal of any forest produce, breaking up or clearing for cultivation, for construction of cattle sheds or for any other purpose, in forest land. Any person who was found bringing forest product without a pass or patta or destroying the forest was liable to be fined Rs 200 to 1000 and/or punished according to the Indian Forest Act. This further restricted the forest dwellers, leading to more problems in the region. Further, in 1972, the Odisha Forest Act was passed (which was mainly based on the Indian Forest Act, 1927). This act standardised the legal basis for forest governance across all Odisha. It also follows the 1927 in the processes of settlement of rights.

Post-Sanctuary

The mangrove forests that abound this region were the habitat of salt water crocodiles and in 1975, a crocodile farm was established on the advice of Dr Bustard and with the help of the United Nations. The entire forest area including the rivers and creeks (total of 672 sq km) were declared as the "Bhitarkanika Wild Life Sanctuary" vide notification No. 6958 – 4F (w) – 34/78-FAH dated 22 April, 1975. The sanctuary area also included 175 sq km of beach area that spread across 35 km of the coastline called "Gahrimatha Marine Sanctuary" famous for the Olive Ridley turtles.

The system continued till the region (Bhitarkanika) was declared as a sanctuary in 1975 and later as a national park in 1998. Access to the forest was gradually reduced and finally a complete shutdown of the system was undertaken by the forest department. Additional laws were passed, including the Forest Conservation Act, 1980, which was an attempt by the Central Government to halt forest loss, compounded the problems related to non-settlement of rights, as it stated that no forest land may be diverted for non-forestry purpose without the permission of the Government of India. This has had the effect of freezing the status of many forest-related rights deprivations. However, the 1988 Forest Policy focused on conservation, subsistence needs and protection of rights of the forest dwellers.

The forests were destroyed only in selected pockets, near the sea coast in the north- east (Das 2003). Around 27.13 sq km of the forest land was reported to be forcibly occupied by people till 1975 when the forest was declared as sanctuary. One of the important reasons is the increase in population. In 1951, this region consisted of only 183 villages with a total population of 38,148 people; this has increased to a total population of 1,63,450 in 2011 (Census 1951; 2011), indicating an increase of more than three times of what it was in 1951. Further, a heavy influx of illegal migrants from Bangladesh, particularly between 1961 and 1971 (Chadha and Kar 1998) and illegal leasing out of the forest land to these people by the local authorities (*Tahasildars*) had put a tremendous pressure on the forest ecosystem. Comparison of the population or number of villages between 1961 and 1971 shows 43 new revenue villages have been established in this area and a very high growth of population is witnessed in some of the villages (*ibid*). It was also seen that during the 1970s-80s, there was an increase in trend for prawn cultivation, which is still practised in this region. Due to heavy remunerations and better opportunities, most of the people started practising shrimp cultivation by encroaching on forest lands, leading to a heavy degradation of the forest.

The construction of the saltwater dikes after the 1971 cyclone, around the entire area to stop intrusion of saltwater and facilitate agriculture has also resulted in further destruction of the forest (as it halted the tidal flood) and increase in area under agriculture. Even after the declaration of the forest area as sanctuary, illegal encroachment on the forest area and illegal harvesting of forest products and hunting of animals continued. Taking the ecological importance of the place, the core area (145 sq km) was declared as the Bhitarkanika National Park vide notification No 8F (F)-53/88, 22904/FFAH dated October 3, 1988.

Illegal activities are still practised in this region and the local people are unhappy with the declaration of the forest as national park (Badola and Hussain 2003). They used a variety of forest products for their day-to-day life. Forest wood products were used for poles, firewood and fibre. Non-wood forest products include thatch, honey, broom sticks, baskets, wildlife, fish, fodder, medicine, etc. Though the area has protected status and legally no extraction is allowed, the villagers living in this areas use the forest mostly for fuel wood consumption. According to the villagers Hentala (local name in Oriya for Phoenix Paludosa Roxb) is the most important mangrove species in the region which has declined over the period. This species is most frequently used for ropes, fencing, fruits, thatching houses, poles for constructing houses, fuel wood and broom sticks. Unfortunately, after the banning of entry to the forest, this species is gradually disappearing as due to lack of human interventions¹¹.

Further, each and every villager during the survey conducted in 2013-14, stated the importance of the Bhitarkanika mangrove forest and how indirectly it helps them in their day-to-day activities¹². The forest acts as a barrier between the sea and the village. It also protects the population during the time of cyclones. Due to the recent deforestation, there is a problem in the form of increased irregularities in rainfall and temperature, as stated by the villagers.

Total requirement of firewood and other similar resources for cooking purposes per household in the villages came out to be 32.4 qtl. /annum. When asked they said that on an average they need

¹¹ *ibid*

¹² *ibid*

nearly 2-6 kg of fuel-wood to cook their food. The villagers mostly depend on cow dung (*Ghass*) and farm products (hay or commonly called as *Kuta*) as no other sources such as LPG, kerosene or coal are easily available. This was the reason why most of the women and the children in the village still go to the jungle once or twice a week for fuel wood and brings home nearly 20 to 25 kgs of wood though illegally, since the use of forest products is banned post-1998, to fulfill their day to day needs¹³.

In India, too, between 80 and 90 per cent of the total domestic fuel consumed in rural areas is made up of fuel wood, agricultural wastes and animal dung (Saxena 1997). Compared with these figures, the per capita fuel wood consumption in the Bhitarkanika area is quite low. The lifestyle of the residents may be one of the factors responsible for the lower rate of consumption of firewood, as the cooking is done mostly once or at times twice a day.

The forest department initially used to give passes for honey collection but later on in order to help the Adivasis, it started to buy honey from the tribals so that they get a fair price for their hard work. However, with the introduction of the national park, things took a turn for the worse. The villagers were banned from going inside the forest and when caught were severely punished with fines or imprisonment or both. Being cut off from every source of income, the people are forced to enter illegally inside the jungle. What was once their own forest now became a foreign land to them and every access to the forest was denied. Traditionally, forest products were also used for construction of houses and agricultural implements. The villagers not only depended on honey, meat and fuel wood but also on many other forest products like fruits, leaves for thatching their houses, leaves for making baskets, ropes and broomsticks, wood for building their house etc. They were completely shut down from all the access provided to them in the past and an age long way of life snatched away from them¹⁴.

According to the Census 2011, there is only two per cent of the population who comes under the ST population but the entire region depends on forest and forest product for their livelihood. Most of the people residing in this region are mostly fishermen and farmers and a few practice shrimp cultivation for livelihood.

Though the recent Forest Act (2007 and 2012) is based on rights-based approaches in conservation rather than the traditional exclusionary approach, in reality the people are yet to derive any benefits from the forest after the declaration of the national park. Due to the historical dependence of the forest dwellers on the forest, presently their livelihood is affected seriously with unemployment and poverty.

Thus, if the legal provisions had been respected and observed, perhaps most of the current tenure problems would not have emerged. However, in many cases it is apparent that they have not been followed properly, and this has given rise to serious forest tenures and rights deprivations to local people. Even where certain rights settlement procedures are followed, the local people are being deprived of their rights. These factors have ensured that large areas of land have been categorized as forest lands without recognizing the rights of local communities on these lands.

¹³ *ibid*

¹⁴ *ibid*

A Chronological Analysis

In the ancient history, Odisha was sparsely populated and mostly covered with forest which made most of the regions difficult to access (Gait 1928). It had been ruled by the powerful Gajapathy kings and had witnessed attacks by many foreign rulers. Flora and fauna, especially elephants, abound in this region (Sterling 1846). Rice, fish, egg-plant and vegetables were the staple cultivation in this region (Jarrett 1891). Many of the natives were engaged in salt production (which was abundantly produced), iron smelter, charcoal burners, boat building and timber felling in this region (Sterling 1846).

The Afghans who invaded the region during 1568-76 AD were solely interested in mining the rich minerals like coal and iron as Odisha was one of the greatest producer of minerals (Gait 1928). The Afghans were least interested in the local affairs and therefore were mostly invaders with an interest to remit as much as possible from the region. It was a flourishing State before the invasion of the Afghans but they did not occupy or colonise the State (Sterling 1846). They just intended to invade, loot and go and therefore they did not interfere in the social and livelihood system of the region. However, they did influence the livelihood system by scaring and looting the people as a result of which many were forced to migrate losing their ways and means of livelihood.

During this regime the State interventions for forest was revenue-oriented, which was dominated by the market forces. The State followed a *laissez-faire* policy that allowed the forest dwellers to freely roam about in the forests and consume its produce, subject only to a yearly payment of rent fixed by the State with very minimum State interventions regarding the exploitation of the forest as there were abundant resources. The revenues collected from forest produce were mostly accrued from trade of forest products like timber, elephants, etc., agriculture and plantation and the ecosystem services used for livelihood were mostly of the nature of use value (in production and consumption). Ecosystem services like water supply, fisheries, collection of fuel-wood, medicinal plants, livestock grazing, agriculture, timber, mining, wildlife resource, transport and recreation.

The Moghuls (who were mostly settlers as well as intruders) and Marathas (who were settlers by nature) were next in line and they also looked upon the forest as a source of revenue as forest land is considered the property of the King or the feudatory chiefs of the region. The Afghans, Moghuls, Marathas and the Rajas followed a *laissez-faire* policy. Thus, the forest dwellers were not alienated from the forest in spite of the state ownership of forest land during this period also.

During this period the forest was not free from commercial exploitations. Valuable goods like timber, ivory, wild silk, honey etc were traded by the State as well as by the local people which was collected from the forest. Forest at that time was much better and was equipped with various produces than what it is today. This is not so because the ecological practices back then were ecologically sound, rather it was because the demand pressure from the larger economy was marginal.

Table 1: A Chronological Analysis of Ecosystem and their Services

Year	Regime	Sources of Revenue from Forest	Resource Use	Ecosystem Services	Conditions of Forest Ecosystem Services
1568-76	Afghans	Trade, Agriculture, Plantation	Exploitative Use	Use Values	Good
1576-1751	Mughals	Trade, Agriculture, Plantation	Moderate Use by most, But a small section of the privileged consumed/enjoyed most of the commodities	Use Values	Good
1751-1803	Marathas	Trade, Agriculture, Plantation	Moderate Use by most, But a small section of privileged society consumed/enjoyed most of the commodities	Use Values	Good
1803-1947	British	Trade, Agriculture, Plantation, Ship building, Railway lines	Large number of users consumed enormous quantities	Use Values	Started Deteriorating
1947-1975	Independent India	Trade, Agriculture, Plantation	Large number of users consumed enormous quantities	Use Values	Deteriorating
1975-2013	Post-Sanctuary	Nil	Banned/ Restrictive use	Non Use Value	Deteriorated already, but improving at a slower rate as result of conservation programme.

Table 2: A Chronological Evaluation of Institution and Forest

Regimes	Personality	State Interventions	Forest and Forest Policies	Existence of Market
Afghans (1568-76 AD)	Intruders	Revenue Orientation	Laissez faire policy	Dominant Market
Mughals (1576-1751)	Intruders and Settlers	Revenue, Recreation, Agriculture.	Laissez faire policy	Dominant Market
Marathas (1751– 1803)	Settlers	Revenue, Recreation, Agriculture.	Laissez faire policy	Dominant Market
British (1803-1947)	Exploitative Interests	Revenue Generation	Indian Forest Act, 1865;1878; 1894;1927	Dominant Market
Independent India (1947-75)	Pro-Poor	Pro-poor	Forest Act, 1952; 1972	Fading
Post -Sanctuary (1976-2015)	Conserving	Protectionist	Forest Act 1980; 1982; 1988, 2003, 2004; Forest Right Act (2007 and 2012)	Illegal Market

Source: Author (Deducted from various historical books and records and from oral history)

With the invasion of the British who were mostly exploitative in nature, started to exploit the forest resources for expanding their market. The immediate need of the State was to construct railways to ensure connectivity within India in all directions during the 1840s. It not only created a demand for coach building but also to build transport facilities, opening up larger economy for forest produce which was mostly done earlier through ports. The British exercised monopoly power on the forest and exploited the forest resources to cater to market demands. Some of the new areas of commercial exchange and trade took routes cutting through the forest (Thapar 2001), further leading to depletion of the forest in India as a whole. It is therefore logical to expect that unless resources were regarded as scarce, conservation attitude would not have prevailed and that it was realised that the local resources could not last long when everybody uses it profusely. This led to the first forest policy in 1865, when the then Governor-General, Lord Dalhousie issued a memorandum on forest conservation. It was the first attempt of the State to declare its monopoly right on the forests. Dietrich Brandies, a German botanist, was appointed as the first Inspector-General of Forest in India for organising a forest department for "scientific exploitation" of forest resources. Rules and regulations were framed to manage the forest resources and help the state exert more controls over the forest resources to produce the basic raw materials for its industries. Subsequent forest laws were modified to further these advantages (Jyotishi 2004). The forest dwellers were allowed to use the produce on a privilege basis (which was given by the local rulers) and not as their rights (Guha 1983). This broke the dependency of the forest dwellers on the forest.

But after the Independence, the Indian government initially acted as the protector of the poor and much importance was given to commercial and revenue use of forest (Forest Act, 1952). However, subsequently in 1972, the State introduced the wild life protection Act with emphasis on the creation of new sanctuaries and national parks, to protect endangered species. Further, Forest (conservation) Act, 1980 and National Forest Policy 1988 were introduced to protect the forest and also to restrict the movements inside it. The State tried to superimpose its power on the forest dwellers to control the use of resources, proclaiming that the State knows how to use the resources. By reserving forest, the State might have intended to protect the forest but in reality, the State hampered the biotic interactions that have been at play between the forest dweller and forest naturally. For example the forest dweller who would have either replanted or cut certain trees which would have helped the forest to grow naturally. Since the forest dwellers were banned from their forests it led to various conflicts between the locals and the concerned authorities and this further led to illegal trading. In effect, all this resulted in destruction of the forest. However, due to distancing from the forest (due to ban on entry into the forest) and with less economic dependence of the people on the forest ecosystem, surprisingly tends to destroy the forest ecosystem as the people are least bothered about the well-being of the forest and its ecosystem.

Conclusion

Historically, if we look into the livelihood system of the people residing in this region, we find that there has been a tremendous change in the system. Being left with no options (fishing, hunting and poaching) most of the youths of the village migrate today to other States in search of work. Kerala

seems to be the favourite destination for most of the people in that region. Apart from Kerala, people seem to migrate to places like Tamil Nadu, Gujarat, Maharashtra and even to Delhi and Rajasthan. Most of the youths who migrate are unskilled and work for Rs 4,000 to 5,000 per month in unorganised sectors. But sometimes the villagers fall in the trap of the middle men and a few even rued that they could not take anything home. In spite of such incidents in the region, there has been no change in the number of villagers migrating to other parts of the country: in fact the number is increasing. It is also witnessed that the traditional livelihood system is slowly disappearing in the region: many people who were dependent on forest for subsistence, like collection of honey, making of ropes etc, are now either shifting to agriculture as their main source of livelihood or migrating. Thus, today the forest ecosystems are catering comparatively less to the economic needs of the people of the region.

History also tells us that there has been a tremendous mismanagement of resources in Bhitarkanika. Forest was undertaken as a free good from nature as has been explained by Hardin's (1968) tragedy of the commons. Generally, the forest dwellers cannot withdraw themselves from the traditional livelihoods due to factors like closely interwoven communities. Forest dwellers are skilled to catch fish, collect honey, farming and collect other forest goods and their skill cannot be used in other sectors and therefore they cannot shift their livelihood. Before the declaration of national park, the forest and the creeks were considered as free access areas and certain resources were considered as common property, which led to an over-exploitation of the resources. However, the ban and restriction provided a boon for the Bhitarkanika forest and helped in reviving the forests together with wild life and reduced the illegal cutting and hunting/poaching. Such policies are needed to ensure better management of the other national parks in India. However, the task of a reversing the population pressure on National Park still remains to be addressed.

References

- Anderies J M, M A Janssen and E Ostrom (2004). A Framework to Analyze the Robustness of Social-ecological Systems from an Institutional Perspective. *Ecology and Society* 9(1):18 [URL: <http://www.ecologyandsociety.org/vol9/iss1/art18>]
- Badola, R and Hussain S A (2003). Valuation of the Bhitarkanika Mangrove Ecosystem for Ecological Security and Sustainable Resource Use. *EERC Working Paper Series*. WB-1.
- Chadha, S and Kar C S (1998). *Bhitarkanika: Myth and Reality*. Dehra Dun: Nataraj Publishers.
- Das, S (2003). Economic Valuation of a Selected Ecological Function – Storm Protection: A Case Study of Mangrove Forest of Odisha. PhD diss., Delhi University.
- Ellis, F (1998). Household Strategies and Rural Livelihood Diversification. *Journal of Development Studies*, 35 (1): 1-38
- (1999). Rural Livelihood Diversity in Developing Countries: Evidence and Policy Implications. Overseas Institute Development, London, Natural Resource Perspective, No. 40. Available at: <http://www.odi.org.uk/sites/odi.org.uk/files/odi-assets/publications-opinion-files/2881.pdf>)
- Forest Survey of India (1999). *State of Forest Report 1999*. Dehra Dun: Ministry of Environment and Forest.

- Forest Survey of India (2015). *India State of Forest Report*. Dehradun: Ministry of Environment, Forest and Climate Change.
- Gadgil, M and Guha R (2013). *This Fissured land: An Ecological History of India*. New Delhi: Oxford University Press. Chapter 2: 61-78.
- Gait, E A (1928). Ancient Bihar and Odisha. *Journal of the Royal Society of Arts*, 76 (3932): 510-29.
- Gómez-Baggethun, E, Groot Rd, Lomas PL and Montes C (2010). The History of Ecosystem Services in Economic Theory and Practice: From Early Notions to Markets and Payment Schemes. *Ecological Economics*, 69: 1209-18.
- Gordon, H S (1954). The Economic Theory of a Common Property Resource: The Fishery. *Journal of Political Economy*, 62: 124-42
- Governor General of India in Council (1865). *A Collection of the Acts*. Calcutta. Available at <http://lawmin.nic.in/legislative/textofcentralacts/1865.pdf>
- Government of British (1882). *The Madras Forest Act*. Available at http://www.forests.tn.nic.in/Legislations/graphics/01_Tamilnadu%20Forest%20Act%201882.pdf
- (1927). *The Indian Forest Act*. Available at <http://envfor.nic.in/legis/forest/forest4.pdf>
- Government of Kanika (1928). *The Forest of Kanika Province*. Cuttack.
- Government of India (1951). *District Census Handbook Cuttack*. New Delhi
- (1952). *National Forest Policy*. New Delhi.
- (1972). *The Indian Wildlife (Protection) Act*. New Delhi. Available at <http://envfor.nic.in/legis/wildlife/wildlife1.html>
- (1980). *Forest (Conservation) Act*. New Delhi. Available at <http://www.envfor.nic.in/legis/forest/forest2.html>
- (1988). *Forest (Conservation) Act*. New Delhi. Available at (<http://www.envfor.nic.in/legis/forest/forest2.html>)
- (2007). *The Forest Right Act*. New Delhi Available at <http://www.forestrightsact.com/>
- (2012). *The Forest Right Act*. New Delhi Available at <http://www.forestrightsact.com/>
- (2011). *District Census Handbook Kendrapara*. New Delhi.
- Government of Orissa (1972). *The Odisha Forest Act*. Bhubaneswar. Available at: http://www.odisha.gov.in/forest_environment/Forest_Act/pdf/Acts/5TOFA_1972.pdf
- Guha, R (1983). Forestry in British and Post- British India: A Historical Analysis. *Economic and Political Weekly*, 18 (44): 1882-96.
- Hardin, G (1968). The Tragedy of the Commons. *Science*, 162: 1243-48.
- Jarrett, C H S (1891). *The Ain-i-Akbari by Abul Fazl Allami*. Calcutta: Asian Society of Bengal (translated print). Pp 126-49. Available at (<https://archive.org/stream/ainiakbarivolum00mubgoog#page/n124/mode/2up>)
- Jyotishi, A (2004). Ecological, Economic and Institutional Aspects of Shifting Agriculture: A Study in Odisha. PhD. diss., Mysore University. chapter 5
- Millennium Ecosystem Assessment (2005). *Ecosystems and Human Well-being: Biodiversity Synthesis*. Washington D.C.: World Resources Institute.

- Panigrahi, R, Nayak A K and Mishra M R (ed) (1998). Documenting Peoples' Knowledge and Priorities for Biodiversity Conservation. *Biodiversity Conservation Prioritisation Project. Site Report of Bhitarkanika Wildlife Sanctuary Documenting, Vasundhara*. Available at <http://vasundharaodisha.org/Research%20Reports/Documenting%20People's%20Knowledge%20and%20Priorities%20Site%20Report%20of%20Bhitarkanika.pdf>
- Rangarajan, L N (1992). *Kautilya: The Arthashastra*. Delhi: Penguin Books. Pp 29,155, 231, 657-58, 733
- Rangarajan, M 2(010). The Forest and the Field in Ancient India, Environmental Issues in India: A Reader. In Rangarajan M (ed), *Environmental Issues in India: A Reader*. New Delhi: Dorling Kindersley India. Pp 42-48.
- Rath, B (2005). Aspects of Garjats Forestry. Vasundhara in collaboration with Centre for International Forestry Research CIFOR. Available at <http://vasundharaodisha.org/Research%20Reports/Aspects%20of%20Garjat%20Forestry.pdf>
- Saxena N C (1997). The Wood Fuel Scenario and Policy Issues in India. *FAO Regional Wood Energy Development Programme in Asia*. Field document No. 49. Bangkok.
- Sterling, A E (1846). *Odisha: Its Geography, Statistics, History, Religion and Antiquities*. London: John Snow: 7-43 URL: <https://archive.org/stream/orissaitsgeogra00pegggooq/page/n12/mode/2up>
- Thapar, R (2001). Perceiving the Forest: Early India. *Studies in History*. XVII: 1-16
- (2010). Forests and Settlement. In Rangarajan M (ed), *Environmental Issues in India: A Reader*. New Delhi: Dorling Kindersley India. Pp 33-44.

Recent Working Papers

- 306 **Determinants of Capital Structure of Indian Corporate Sector: Evidence of Regulatory Impact**
Kaushik Basu and Meenakshi Rajeev
- 307 **Where All the Water Has Gone? An Analysis of Unreliable Water Supply in Bangalore City**
Krishna Raj
- 308 **Urban Property Ownership Records in Karnataka: Computerized Land Registration System for Urban Properties**
S Manasi, K C Smitha, R G Nadadur, N Sivanna, P G Chengappa
- 309 **Historical Issues and Perspectives of Land Resource Management in India: A Review**
M S Umesh Babu and Sunil Nautiyal
- 310 **E-Education: An Impact Study of Sankya Programme on Computer Education**
N Sivanna and Suchetha Srinath
- 311 **Is India's Public Debt Sustainable?**
Krishanu Pradhan
- 312 **Biomedical Waste Management: Issues and Concerns - A Ward Level Study of Bangalore City**
S Manasi, K S Umamani and N Latha
- 313 **Trade and Exclusion: Review of Probable Impacts of Organised Retailing on Marginalised Communities in India**
Sobin George
- 314 **Social Disparity in Child Morbidity and Curative Care: Investigating for Determining Factors from Rural India**
Rajesh Raushan and R Mutharayappa
- 315 **Is Access to Loan Adequate for Financing Capital Expenditure? A Household Level Analysis on Some Selected States of India**
Manojit Bhattacharjee and Meenakshi Rajeev
- 316 **Role of Fertility in Changing Age Structure in India: Evidence and Implications**
C M Lakshmana
- 317 **Healthcare Utilisation Behaviour in India: Socio-economic Disparities and the Effect of Health Insurance**
Amit Kumar Sahoo
- 318 **Integrated Child Development Services in India – A Sub-National Review**
Jonathan Gangbar, Pavithra Rajan and K Gayithri
- 319 **The Infrastructure-Output Nexus: Regional Experience from India**
Sumedha Bajar
- 320 **Uncertainty, Risk and Risk Mitigation: Field Experiences from Farm Sector in Karnataka**
Meenakshi Rajeev and B P Vani
- 321 **Socio-Economic Disparities in Health-Seeking Behaviour, Health Expenditure and Sources of Finance in Orissa: Evidence from NSSO 2004-05**
Amit Kumar Sahoo and S Madheswaran
- 322 **Does Living Longer Mean Living Healthier? Exploring Disability-free Life Expectancy in India**
M Benson Thomas, K S James and S Sulaja
- 323 **Child and Maternal Health and Nutrition in South Asia - Lessons for India**
Pavithra Rajan, Jonathan Gangbar and K Gayithri
- 324 **Reflecting on the Role of Institutions in the Everyday Lives of Displaced Women: The Case of Ganga-Erosion in Malda, West Bengal**
Priyanka Dutta
- 325 **Access of Bank Credit to Vulnerable Sections: A Case Study of Karnataka**
Veerashekhharappa
- 326 **Neighbourhood Development and Caste Distribution in Rural India**
Rajesh Raushan and R Mutharayappa
- 327 **Assessment of India's Fiscal and External Sector Vulnerability: A Balance Sheet Approach**
Krishanu Pradhan
- 328 **Public Private Partnership's Growth Empirics in India's Infrastructure Development**
Nagesha G and K Gayithri
- 329 **Identifying the High Linked Sectors for India: An Application of Import-Adjusted Domestic Input-Output Matrix**
Tulika Bhattacharya and Meenakshi Rajeev
- 330 **Out-Of-Pocket (OOP) Financial Risk Protection: The Role of Health Insurance**
Amit Kumar Sahoo and S Madheswaran
- 331 **Promises and Paradoxes of SEZs Expansion in India**
Malini L Tantri
- 332 **Fiscal Sustainability of National Food Security Act, 2013 in India**
Krishanu Pradhan
- 333 **Intergrated Child Development Services in Karnataka**
Pavithra Rajan, Jonathan Gangbar and K Gayithri
- 334 **Performance Based Budgeting: Subnational Initiatives in India and China**
K Gayithri
- 335 **Ricardian Approach to Fiscal Sustainability in India**
Krishanu Pradhan
- 336 **Performance Analysis of National Highway Public-Private Partnerships (PPPs) in India**
Nagesha G and K Gayithri
- 337 **The Impact of Infrastructure Provisioning on Inequality: Evidence from India**
Sumedha Bajar and Meenakshi Rajeev
- 338 **Assessing Export Competitiveness at Commodity Level: Indian Textile Industry as a Case Study**
Tarun Arora
- 339 **Participation of Scheduled Caste Households in MGNREGS: Evidence from Karnataka**
R Manjula and D Rajasekhar
- 340 **Relationship Between Services Trade, Economic Growth and External Stabilisation in India: An Empirical Investigation**
Mini Thomas P

- 341 **Locating the Historical Past of the Women Tea Workers of North Bengal**
Priyanka Dutta
- 342 **Korean Media Consumption in Manipur: A Catalyst of Acculturation to Korean Culture**
Marchang Reimeingam
- 343 **Socio-Economic Determinants of Educated Unemployment in India**
Indrajit Bairagya
- 344 **Tax Contribution of Service Sector: An Empirical Study of Service Taxation in India**
Mini Thomas P
- 345 **Effect of Rural Infrastructure on Agricultural Development: District-Level Analysis in Karnataka**
Soumya Manjunath and Elumalai Kannan
- 346 **Moreh-Namphalong Border Trade**
Marchang Reimeingam
- 347 **Emerging Trends and Patterns of India's Agricultural Workforce: Evidence from the Census**
S Subramanian
- 348 **Estimation of the Key Economic Determinants of Services Trade: Evidence from India**
Mini Thomas P
- 349 **Employment-Export Elasticities for the Indian Textile Industry**
Tarun Arora
- 350 **Caste and Care: Is Indian Healthcare Delivery System Favourable for Dalits?**
Sobin George
- 351 **Food Security in Karnataka: Paradoxes of Performance**
Stacey May Comber, Marc-Andre Gauthier, Malini L Tantri, Zahabia Jivaji and Miral Kalyani
- 352 **Land and Water Use Interactions: Emerging Trends and Impact on Land-use Changes in the Tungabhadra and Tagus River Basins**
Per Stalnacke, Begueria Santiago, Manasi S, K V Raju, Nagothu Udaya Sekhar, Maria Manuela Portela, António Betaâmio de Almeida, Marta Machado, Lana-Renault, Noemí, Vicente-Serrano and Sergio
- 353 **Ecotaxes: A Comparative Study of India and China**
Rajat Verma
- 354 **Own House and Dalit: Selected Villages in Karnataka State**
I Maruthi and Pesala Busenna
- 355 **Alternative Medicine Approaches as Healthcare Intervention: A Case Study of AYUSH Programme in Peri Urban Locales**
Manasi S, K V Raju, B R Hemalatha, S Poornima, K P Rashmi
- 356 **Analysis of Export Competitiveness of Indian Agricultural Products with ASEAN Countries**
Subhash Jagdambe
- 357 **Geographical Access and Quality of Primary Schools - A Case Study of South 24 Parganas District of West Bengal**
Jhuma Halder
- 358 **The Changing Rates of Return to Education in India: Evidence from NSS Data**
Smrutirekha Singhari and S Madheswaran
- 359 **Climate Change and Sea-Level Rise: A Review of Studies on Low-Lying and Island Countries**
Nidhi Rawat, M S Umesh Babu and Sunil Nautiyal
- 360 **Educational Outcome: Identifying Social Factors in South 24 Parganas District of West Bengal**
Jhuma Halder
- 361 **Social Exclusion and Caste Discrimination in Public and Private Sectors in India: A Decomposition Analysis**
Smrutirekha Singhari and S Madheswaran
- 362 **Value of Statistical Life: A Meta-Analysis with Mixed Effects Regression Model**
Agamoni Majumder and S Madheswaran
- 363 **Informal Employment in India: An Analysis of Forms and Determinants**
Rosa Abraham

Price: ₹ 30.00

ISBN 978-81-7791-220-3



INSTITUTE FOR SOCIAL AND ECONOMIC CHANGE

Dr V K R V Rao Road, Nagarabhavi P.O., Bangalore - 560 072, India
Phone: 0091-80-23215468, 23215519, 23215592; Fax: 0091-80-23217008
E-mail: lekha@isec.ac.in; Web: www.isec.ac.in