# *Rajbanshi Indigenous Knowledge for Ecological Resource Management*

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***Abstract:*** Rajbanshi social fold of Sub-Himalayan West Bengal and its northern plains and watersheds incorporates various castes, tribes and communities. They are mostly agriculturalists and a few attached with forestry to collect minor resources.

Rajbanshis are good with ecological resource management. Their management of agricultural biodiversity, sacred groves, water bodies, watersheds and marshlands are too good. They rear cattle and poultry. Their knowledge base can be a target for microfinance. They also know about forest resource, agro-forestry, and social forestry. They in this way mitigate the demands of wood, fuel, herbal remedy and wooden plough and other implements. They can protect local seeds as well as indigenous rice, vegetable and bamboo varieties. Women play the most important role. They have developed complex agrarian systems that they provide religious assistance and make integral part of folk life.

They maintain their structures on resource management (or substructure) assisted by the superstructure.

***Introduction***

Indigenous Knowledge (IK) is basically local (Warren, 1991). It is actually oral and mostly undocumented (Ellen and Harris, 1996). It is more practical rather than theoretical and repeating with time. IK generates through informal experiments, intimate understanding of the environment in a given culture and accumulation of generation wise intellectual reasoning of day to day life experiences (Rajsekharan, 1993). It is generally tested in the religious labouratory of survival. So, it could be said that Indigenous Knowledge traits are oral, undocumented, simple; dependent over the values, norms and customs of the folk life (>folk culture>material apparatus), production of day to day life experience through trial and error, loosed and gained as well as asymmetrically distributed. These knowledge traits therefore form a system called on as the Indigenous knowledge System (IKS). To some portion, IKS of an indigenous community shares itself with the western and other major Knowledge Systems (and at the same time differing a lot); and integrated intensively with the foundation of Global Knowledge System.

Holistically, IKS is quite fragmentarily distributed throughout the globe that is socially clustered. But within a specific society, it looks like the actual knowledge of a given population There it forms a systematic body of knowledge acquired by the local people. The knowledge bulk seems to be indigenous in respect to a particular geographic area. All of these farmers, landless labourers, women, rural artisans and cattle rarer are well informed about their own situations and their resources; what works and doesn't work and how one change impacts other parts of their system. Culture of such a community is mentioned as the indigenous culture where it is really hard to separate the technical part from the non-technical one and the rational domain with the non-rational sector. IKS is a multidisciplinary subject and incorporates the following dimensions: physical sciences and related technologies, social sciences and humanities (Atte, 1989). IK is also regarded by several names, such as, folk knowledge, traditional knowledge, local knowledge, indigenous technical knowledge (ITK), traditional environmental/ ecological knowledge (TEK), People's science or ethnology that often look very much confusing and overlapping. On the community basis, IKS could be divided into various domains like Agriculture and Post-Agricultural Practices; Animal Husbandry and Poultry; Ethno-Fishery; Hunting and Gathering; Artisan; Disease Treatment, Ethno-Medicine and Folk Remedy; Traditional Economic and Political System (Banarjee, Basu, Biswas, and Goswami, 2006).

The indigenous communities are all fallen under the great umbrella of Indigenous Peoples and share the basic attributes of Indigenous Rights (ILO, 1991). Indigenous Rights encompass the domains like general policy, land, recruitment and conditions of employment, vocational training, handicrafts and rural industries, social security and health, Education and means of communication, contracts and co-operations across borders, administration, general provisions- applicable to all the indigenous communities brought under the common umbrella of Indigenous Peoples. In a more formal side, these rights are also related with other issues such as prevention of bio-piracy, check to illegal knowledge-and-technology transfer, and performance of sustainable development, protection of basic human rights, rights for the minority communities and weaker sections, intellectual property rights as well as suitable management of various capitals for instance nature capital, social capital, culture capital, human capital, intellectual capital, instructional capital, and knowledge capital (in the forms of natural resource management, human resource management, knowledge management and so on) [*See*: Fig.1]. In this era of globalization, the rapid developmental activities of the Western-Modern Society have caused 6 major problems as pointed out by UNDP report: Challenges of global warming, Rapid loss of bio-diversity, Crisis-prone financial market, Growing international inequality, Emergence of new-drug resistant disease strains & Genetic engineering (Kaul, Grunberg and Stern, 1999). In this regard, Science, Traditional Knowledge and Sustainable Development (ICSU) in the Series on Science for

Sustainable Development No. 4 have truly mentioned that the IKS of the local/rural/indigenous communities (basically under the banner of 'underdeveloped' or Indigenous Peoples category) could be applied so as to control these crises.

Loss of biodiversity is one of the four highest risks to natural ecology and human welfare. Biodiversity is a public policy as well as a scientific issue. It is stratified into a four-level hierarchy (i.e., genetic, species, ecosystem and landscape. It maintains ecosystem stability. It provides major cost-free Global Public Services in terms of food, fiber, industrial compounds, fuel and drugs. It has some definite anthropocentric reason so as to preserve different IKS and related cultural diversities. It would ultimately help in the issues of genetic conservation, agriculture and fisheries, forests, wildlife and wetland management [Cairns, and Lackey1992]. The highest extinction rate of 1,000-10,000 species per annum since the mass extinction of 65 million years ago has become a serious problem and need help from IKS of the folk people living in nature for thousands of years.

IKS is good for preserving this bio-diversity. Proper networking among ethno-botanical knowledge of local people, integrated farming units, ecosystem, sustainable rural and human recourse development, existing cultural diversity and modern inputs is obviously helpful in genetic conservation of the crop plants and their wild varieties with medicinal

values; broadening the genetic base of many important agricultural crops and enhancing resistance capacity against insects and pathogens as well as development of more viable crops without any genetic engineering, but in natural way *in situ* (CBD; Altieri *et. al.* 1987; Hoyt, 1988; Brush, 1989; Williams, 1991; Lamola, 1992). However, traditional agricultural knowledge system provides empirical insight into crop domestication, breeding, and management. It further acts in favor of agro-ecology, agro-forestry, crop rotation, pest and soil management and other agricultural activities. It develops guidelines of natural forest management and biodiversity management. It also delivers information about reservation of fruits and vegetables (Lal, Siddappa, and Tandon, 1986). It behaves like a good source of various fermentation processes (Battcock and Azam-Ali, 1998). It is related to application of indigenous fermented foods (Steinkraus, 1996). It deals with manufacture and use of pickles, dry foods, liquor, spices, sun-dried elements, soil preserved food, concept of fresh food and various types of food taste (Fellows, 1997). It is again involved in formulation of proper relationship between traditional knowledge and biodiversity conservation. Actually, farmers remain no longer passive consumers, but active problem solvers (Warren, 1991). So, the highest priority is going to be given upon alternative role of IKS against the high-cost modern crop production system (Davis and Ebbe, 1993). It could let a low-level external input among the resource-poor agriculturists living in nature-surrounded remote areas (Haverkort, Reijntjes and Waters-Bayer 1992). It is exclusively related to the traditional non-subsistence symbols and technologies

developed without direct inputs from the formal sector (Chambers *et al* 1989, and Gilbert *et al* 1980). It involves local-level innovation and their transmission to a wider periphery (Warren in 1991). This agriculture related IKS is exclusively related to the communication process between informal and institutional sectors (Norgaard, 1948; World Bank, 1990; Lamola, 1992; Slikkerveer, von Liebenstein, and Warren in 1993). Actually, farmers are not passive consumers, but active problem solvers and develop most of the technology they use for themselves (Warren, 1991). But the most important thing is that an anthropologist on humanitarian ground not only highlights at the biodiversity, but also penetrates into the aspects like proper utilization of IKS, protection of World View, politico-economic perspectives of a definite geography, impact of trade, sate formation, migration and multiculturalism, social mobility and civilization, changes and transformation[1,2].

Several research scopes regarding the application of IKS within the production domain are as follows:

indigenous technical practices in a specific farming system (Rajasekaran, 1993);

indigenous way of soil and water conservation (Kerr and Sanghi, 1992);

indigenous soil classification (Dvorak, 1988);

role of rural women in biodiversity management (Domoto, 1994);

the very nexus among the various aspects of indigenous knowledge, indigenous peoples and sustainable agricultural practice (Nakashima and Roué, 2002)

availability of good quality seed important for crop production and food security (Louwaars, 2007).

Here, in this research program, Rajbanshi Social Fold of northern West Bengal in respect rich bio-diversity present in each and every segment of bio-geographical zones (like, river plains, low land, up land, forest, marsh, foothills of Duars foothill and Terai) has been selected.

Rajbanshis are so exclusive within the social structure of North Bengal. Without the Rajbanshis neither organization of social structure in North Bengal nor IKS embedded within folk life could ever be recognized. According to Census 2001, Hindu Rajbanshis are 129,904 in Darjeeling of total individual 1,609,172; in Jalpaiguri 811,567 out of 3,401,173; in CoochBehar 972,803 out of 2,479,155; in Malda 144,158 out of 3,290,468; in North Dinajpur 405,140 out of 2,441,794 and in South Dinajpur, 224,988 out of 1,503,178 and there of total 14,724,940 of North Bengal, Rajbanshis have a population of 2,688,560 (18%). Rajbanshis are Hindus and have caste identity; they usually use specific surnames of Hindu ruling categories [such as *Roy, Burman, Singha, Sarkar*]. On the contrary, same Rajbanshis are quasi-egalitarians and share common clan name (*Kashyapa*) with other local Hindu Bengali Vaishnava categories (such as, *Namasudra, Jalia Kaibartta, Kaibartta* and *Paliya*). They all belong to Schedule Caste category but share some kind of community sentiment with other non-scheduled Vaishnava and other

Bengali caste categories (*Sutradhar, Pal, Nath, Ghosh, Saha* and others). Converted Rajbanshis into Islam are known as *Nasya Sheikh*. Rajbanshis have some tribal affinity also. They have their own stratification [*Koch-Rajbanshi, Desi, Dhokra* and others]. In Terai-Duars, Rajbanshis are lesser in number if compared with Mongoloid tribes (*Boro, Garo, Mech, Koch, Rabha, Toto, Dukpa*); ethnic and caste elements originally from Nepal Himalayas; and *Adivasi* migrated tribes ("aboriginals" /Proto-Australoids and Dravidians from Central India). Rajbanshis in agricultural landscape are paralleled by *Santhal, Oraon* and some other *Adivasis* which is different in composition in the tea gardens where *Oraons* and *Mundas* are reluctant in number. Darjeeling and Kalimpong hills are now overpopulated by *Nepali* castes and ethnic groups along with elements like *Tibetans, Lepchas, Limbus, Bhutias* and few others.

***Methodology***

Muchena and Williams in 1991 cited the argument of Bennett (1980) and mentioned that human components are actually analytical equivalents to environmental components in a given socionatural system. Indeed, "every native farming practice...has back of it a definite (and to the native a sensible) reason. These reasons are based on tradition, superstition, worship of the departed dead and fear of the unknown" [Alvord (1929)]. Muchena and Williams also cited Brokensha et al., 1980, and Posey, 1983, as they had

indicated to the difficulties in front of encoding in religious beliefs, rituals, ceremonies and myths highly related with the IKS. To gather the IKS of a given community, the researcher has no better option than to decode these symbols.

There exist several knowledge gaps in various domains of folk life; of which the major ones are as follows:

agriculture: post and pre agricultural activities;

knowledge about wild and disease resistant varieties, weed management and pest control;

bio-fertilizer and indigenous way of soil classification (Babu, Rajsekaran and Warren, 1991; Brokensha, Slikkerveer and Warren, 1993);

informal *ex situ* experiments of the farmers;

division of labour, barter system, reciprocity and community health;

water management, ethno-fishery, animal husbandry and animal product;

agro-forestry (Alcorn,1990; Khaleque and Gold, 1992) and forest produce

house construction and cottage industry;

indigenous way of classification (Sengupta, 2003);

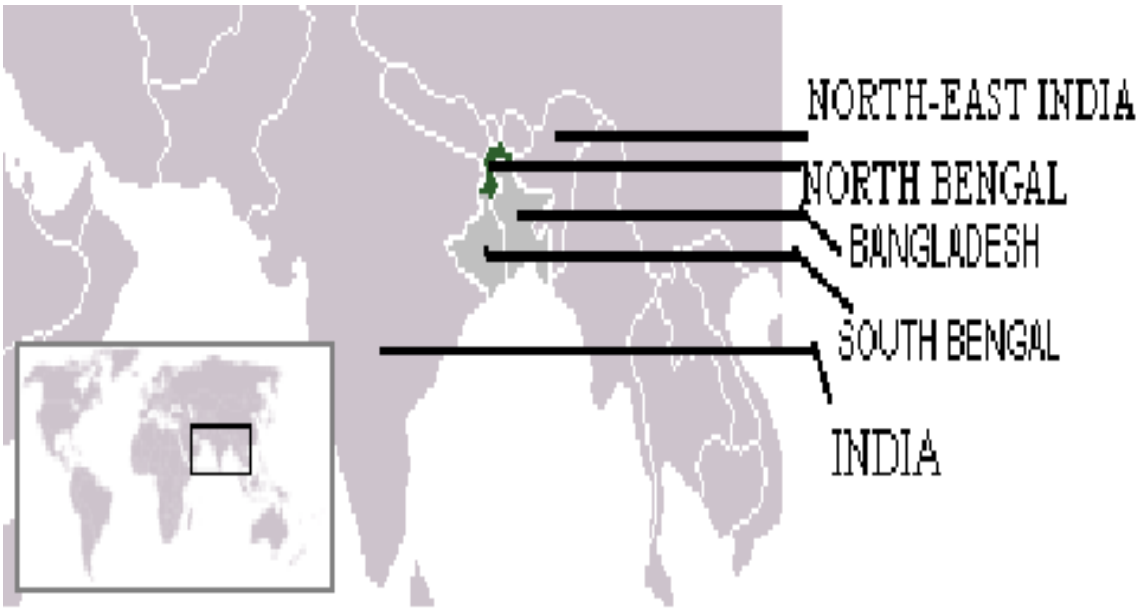
protection of biodiversity and assure sustainable development.

From India, North Bengal that is the northern part of West Bengal on and beneath eastern Himalayan track is one of the Earth's most important biodiversity hotspots[3] (Alfred et al.

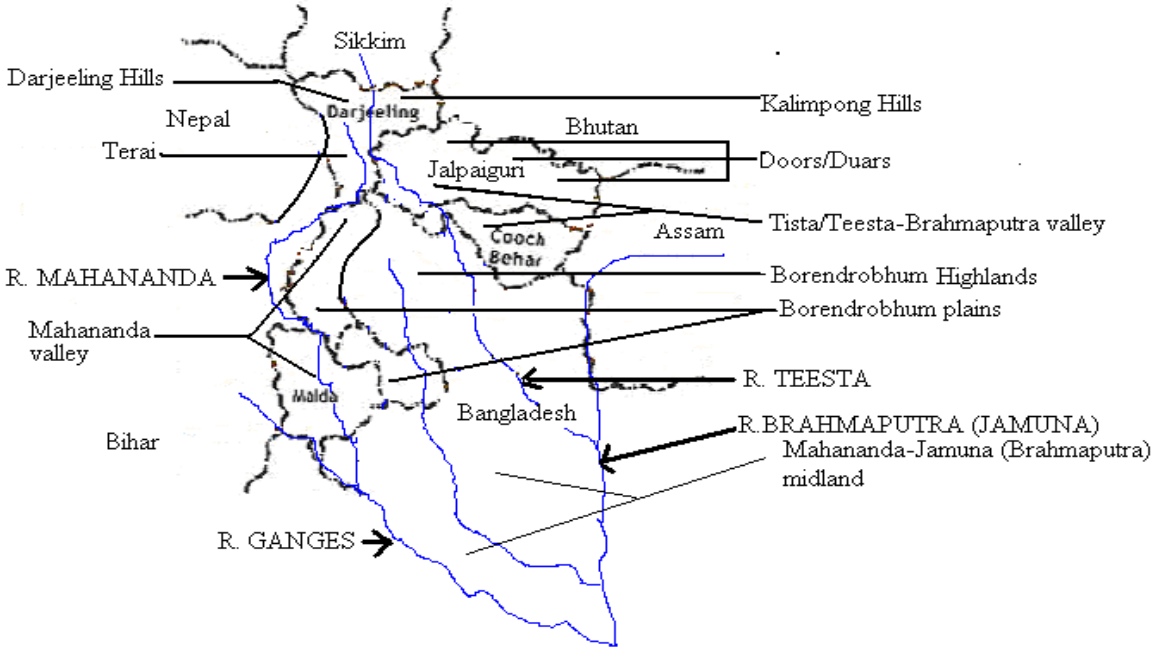
2003). IKS of the indigenous communities of North Bengal are all important to fight back against certain critical challenges: habitat loss, wildlife killing, illegal logging, flood, drought, crop failure, pollution, overpopulation, mining, forest and grassland fires, soil erosion, lack of information and planning, insurgency- all related to biodiversity loss (WWF-US, Asia Program, 2005).

Six districts, namely Darjeeling, Jalpaiguri, CoochBehar, North Dinajpur, South Dinajpur and Malda now constitute the geography of North Bengal. Of these Darjeeling is constituted by Darjeeling hills beneath Sikkim Himalayas and foothill Terai. According to Sanyal (1965), the Rajbanshis- a unique social fold- are the agrarian caste of this North Bengal river valleys and therefore I am selecting their IKS applicable in service of the bio-diversity, sustainable development and community welfare of North Bengal [See: Fig.2].

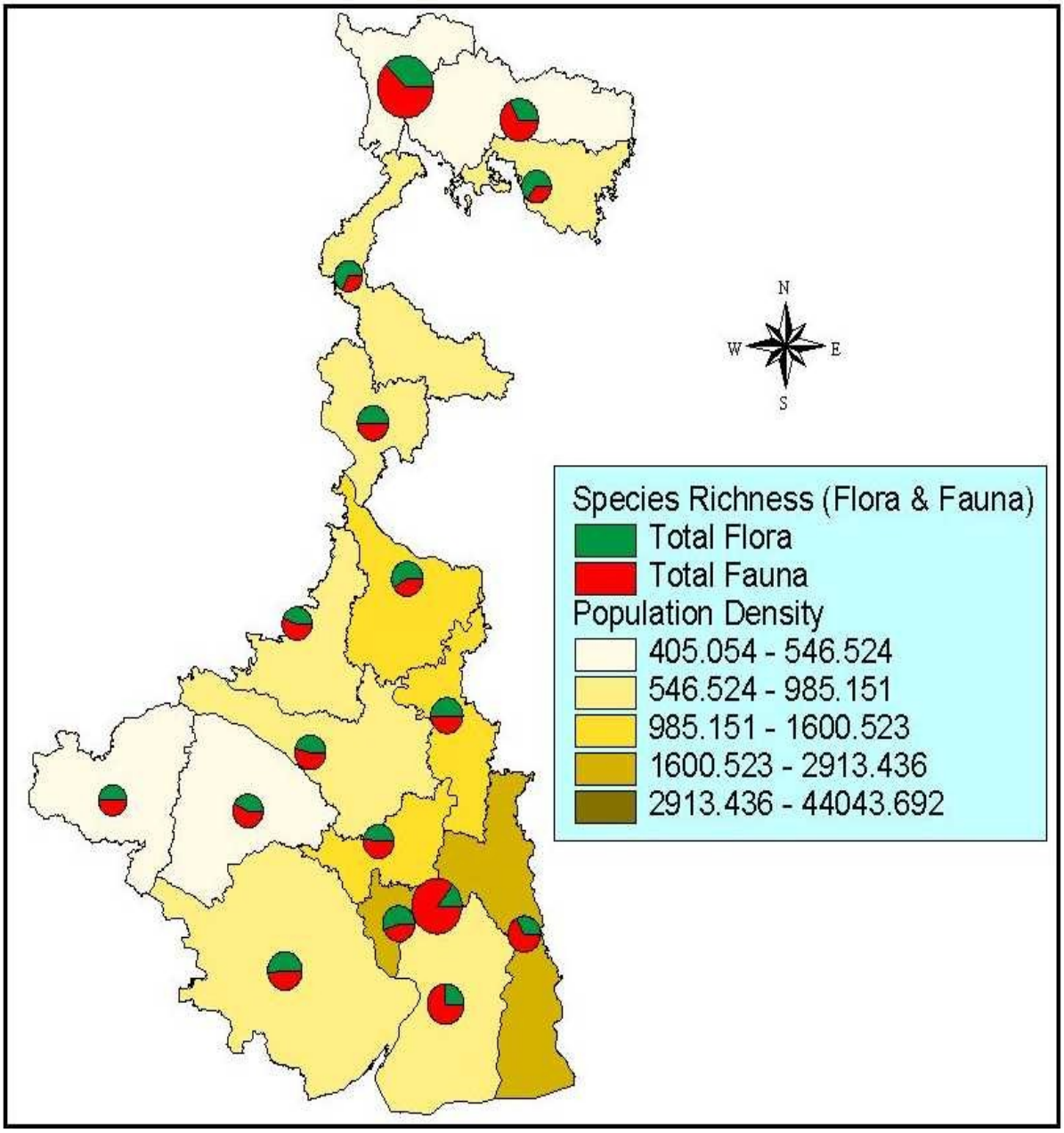
Map1: LOCATION OF NORTH BENGAL (not to scale)



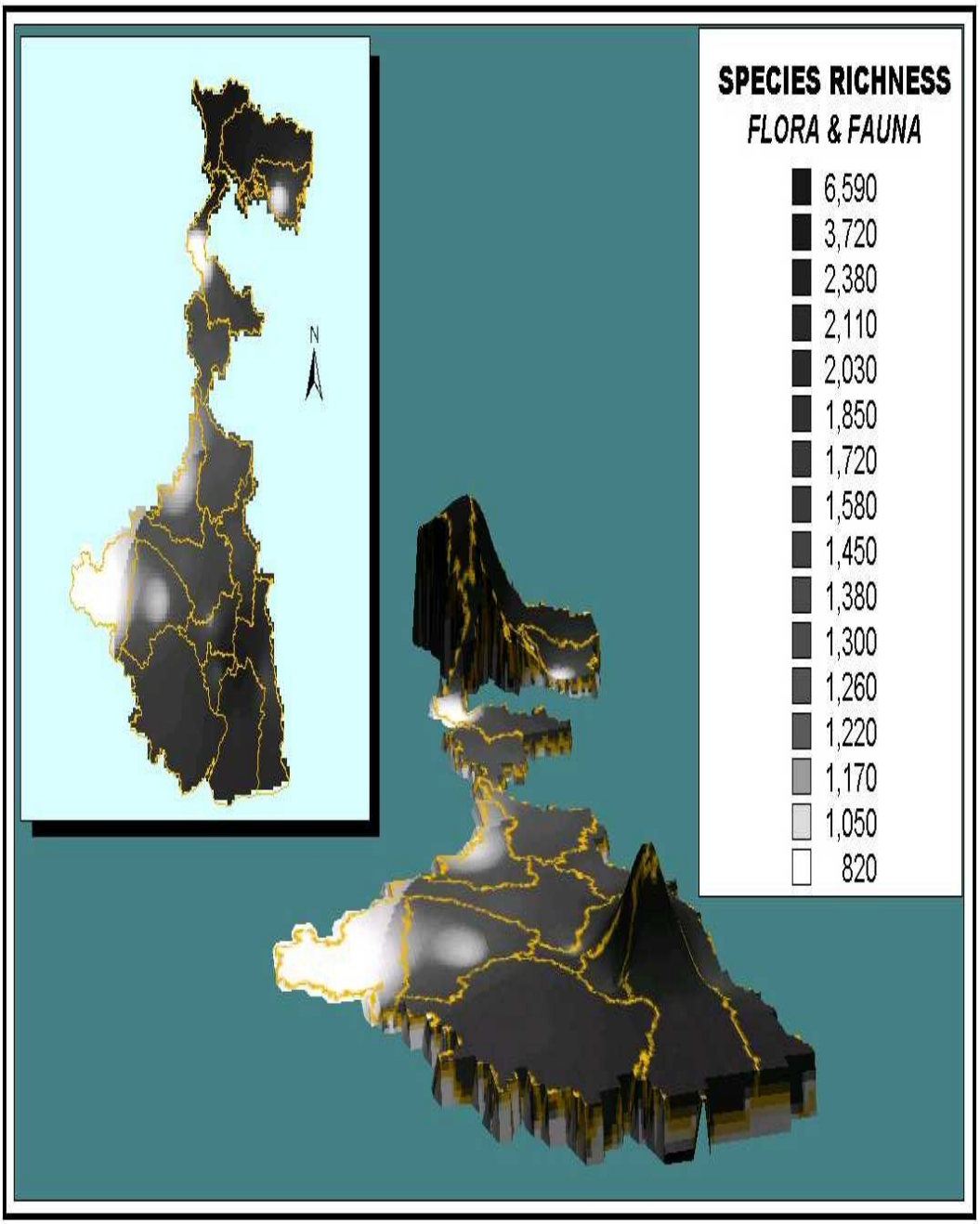

Map 2: DIEERENT REGIONS OF NORTH BENGAL (not to scale)




Map 3: Human population density (per sq.km) and species richness (flora & fauna) in West Bengal




Map 4: Grid-wise concentration of species richness in different parts of West Bengal


SPECIES RICHNESS
FLORA & FAUNA
6,590
3,720
2,380
2,110
2,030
1,850
1,720
1,580
1,450
1,380
1,300
1,260
1,220
1,170
1,050
820
N

***Discussion***

Despite all the cultural lag, Rajbanshi countrymen have maintained their traditional customs and faith unchanged and that could be easily viewed in their festivals: *Mecheni Khela, Tista Buri, Satya Pir, Modon Ka/Bans Khela, Jagannath & Balaram Thakur, Dharam Thakur, Geram Thakur*(summer); *Kachibuna, Hudum deo/ Benger biao*(monsoon), *Amati, Sotyonarayana, Dodi Kado, Othai pothai, Jitau, Bara bhasha, Bharar Ghorchhura, Lokhi dak, Devi, Boro Debi, Bishahari, Jatra Puja, Bhandani* (spring); *Chondi, Dhap chandi, Kali Thakur, Khet Uthani* (*Hemanta* or after-spring)*, Pushuna, Shial Thakur, Baruni sinan/ Maghli sinan, Shiva rati, Gamira Thakur, Chorok, Shiva Chaturdashi* (winter); *Dham, Rakhal Thakur, Shaleshwari, Gorakhnath, Bishua* (autumn); *Jiga Thakur, Tulshi Thakur, Jurbandha Thakur* (anytime in the year) and fear of *Pairy, Jak, Mashan* and other harmful entities.

An outline of Rajbanshi IKS in service of agro-based biodiversity is going to be given below:

At early days, Rajbanshis did not cultivate paddy varieties throughout the whole year, but only in a specific season; so cultivation is seasonal and not yearly. They preferred cultivation in the monsoon season. Rajbanshis of upper portion of North Bengal plains (condescended with forestry) left the cultivation ground for a season or a year or several years that they considered good for maintenance and increase of the productivity. They did not cultivate at single fixed place overtime; time to time they changed the place of

crop-cultivation. They called it *jhum* cultivation where the bush and trees of the selected area were cut off to let them rotten or burn with fire and then they planted there the crops. In that way, the slash-and-burn type of cultivation in late winter when soil was covered with deciduous leaves of shorea and teak freed the ground full of ash and under clear sky with pleasant sunshine of spring from harmful insects. Light raining of late winter and temperature fall in night made the ash fertile and seeds were spread unevenly in summer or at the time monsoon launched the Himalayan terrains and Sub-Himalayan valleys. This system did not fit in those regions of the lower plains where both the population size and the expectation from the cultivation were larger and higher. In the present day, *jhum* cultivation has become quite invalid, but still ash is used as both forms of manure and pesticide. Rajbanshis have improved *jhum* cultivation with introduction of wooden plough and applied the technique of sowing the saplings rather than the seeds with help of a digging stick. Later, Rajbanshis have started preferring crop cultivation basically in the flood prone areas. They have generally classified the soil type into three: *danga* (highland), *nichu* (lowland) and *jola* (marshy land). There is complete absence of farm houses and no option of equity investment in the agriculture sector by big capitalists. Land distribution has so far progressed here and small to middle scale peasants have become the land owners and the rest in the quasi-unorganized sector of landless labours, share croppers and other agriculture oriented jobs, old to new. The earthen boundaries of these landscapes are called the *aal* and used by the cultivators to go into the field. *Danga*

is preferred for vegetable cultivation, production of wheat and *marua*, habitation and kitchen garden, bamboo propagation, sacred groove and grazing. The *nichu* land is considered appropriate for rice cultivation. In winter, the Rajbanshis at the *nichu* land cultivate several types of vegetable along with *makoi* (corn) on the sloppy landscape; whereas propagate wheat on the *danga* region. The lowland areas are used for production of pulses and mustered (along with other rapeseeds like *rai* and *tisi*). Pulses are of different varieties: *maskalai, thakurkalai*, pea, gram, moog and *khesari*. Jola region is good for jute, water hyacinth and arum, while the slopes for the ferns. Sandy river bed in foothill areas is good for spices, watermelon, poppy, cardamom, ginger, garlic, and *tejpata* as well.

Rajbanshis used to cultivate paddy and jute. Rajbanshis prefer rice cultivation the most. Rice sowed in winter season is the *boro* type, whereas *joli*, *aush* and *amon* are propagated in marshy land, during summer-early spring and early monsoon-late spring respectively. *Kaon* or *Kamon*, basically growing up with *boro* rice, is a variety of millet with smaler grain size. It is not too tasty as other improved qualities of paddy. *Kaon* is a suitable example of domestication and gradual improvement of a wild variety into the category of a crop. It grows reluctantly in the natural environment of North Bengal on and aside the *aal* the divider and pathway inside the crop field. At a time, Rajbanshis used to eat hotchpotch of boiled *Kamon* or *Kaon*. *Kaon* was served as hotchpotch in festivals. Later

both *Kaon* and traditional verities of rice were replaced by the high yielding hybrid rice varieties and other types of vegetables. Along with rice cultivation of the winter verities, aal is often modified for the cultivation of various vegetables grown at higher landscape. It increases the profit amount of the cultivator. However, *Amon* varieties they have preferred the most are *Kukra or Kukurjali, White Nunia, Black Nunia, Tulaipanji, Swarna, Kalam, Payejam, Mala, Dighe, Banshiraj, Aralia, Baran, Nalach, Kechardam, Harigachhi, Bayaj, Fulbete, Ropa* and so on. Some *aush* verities are *Pakshiraj, Tepishal, Nayachur, Muktahar, Bhadma, Chapari, Kotki, Shate* and so forth. Mala ripens most quickly. Rajbanshis have the concept of six seasons like summer (*Greeshma*), rain (*Varsha*), spring (*Sarat*), foggy (*Hemanta*), clod winter (*Sheet*) and autumn (*Vasanta*); each with two months out of total twelve. Rajbanshis usually cultivated rice in the season of monsoon and cut it in the season of *Hemanta* - a typical season between spring and winter when the dews started falling on earth. Sowed with the first monsoon rain of June, this Mala variety blooms so fast and hence, the rice grains are found available in stalks before the annual festival of durga / bhandani that is the worship of Mother Goddess in the very next *Sharat* / Spring season (September-October). It could not wait till the season of *Hemanta*. In settled cultivation, after collection of the crops of rainy and spring seasons and their harvest throughout the month of *Hemanta*, crops are again cultivated in winter. Rajbanshis raise their stock throughout the first part of winter season. On the last date of first month of winter season, *Poush*, Rajbanshis go to the cow shade and bind a

bundle of crop on the bamboo pole. Rajbanshis go on pilgrimage to their supreme deity, *Jalpesh*, once at the season of autumn with the prayer for good production of the winter crops, and then again in rainy season. Black cloud in north east indicates heavy storm with lashing rain. Rain started in Saturday continues for seven days, whereas in Tuesday lasts for three days. For paddy and jute cultivation, bright sunshine in day time and rain in night are highly required. In spring, breezing wind comes from the south and in winter, cold wind from north and north-west affect the common men. Raining in spring causes damage to the ripening crops in the field and if there is lashing, the effect would be more serious and deadly. Heavy rain in late autumn and/or early summer is also deleterious to the mango inflorescence. Indeed, in every step of agriculture practices, there are some exclusive folk attributes in the form of myth and festivals throughout the year that always say something about the Rajbanshis Folk Life and their IKS. *Kukurjali* was very sacred to them and they generally served meal with the rice from this paddy on ceremonial occasions like rite-de-passage, religious festivals and agricultural ceremonies. Black *Nunia* is dark in color; when the crops are full grown, the field looks black and the air is filled up with a special fragrance. Grains of Black *Nunia* are relatively small, but very much tasty; it is sold in market in higher price level than the hybrid varieties due to its low production. *Nunia* is also there, their seed coat color is golden. Rajbanshis are concerned about high nutritious value of *Nunia* rice. A small quantity of *Nunia* rice can fill the belly fully of a person for the whole day. A handful of *Nunia* paddy (taken for

cook) could provide a higher amount of cooked rice. *Swarna* gives a higher yield, nearly twice than that of *Kalam*. *Kalam* is the rice with thin elongated grains and also of good taste. Rajbanshis yield another variety of paddy, *Dharial*, which is known for its pressed shape and therefore used exclusively in production of the preserved rice products (*muri*- puffed rice; *chira*- bitten rice; *khoi*- pressed rice). The production amount is supposed to be higher in rainy season, but due to flood or irregular or untimely rain fall, the quantity could not always reach to the optimum margin. The costly irrigated cultivation process in the dry winter season with relatively low crop production often assures the Rajbanshi cultivators a fixed amount of income. In winter irrigation facilities are required. With the help of bucket and bamboo pipes, water is taken out of wells or from the canals or numerous small rivers that traverse the entire geography of northern West Bengal plains into many landscapes. In the time of ripening of crop, they have to take special cure so that cattle, birds, rat, bat or elephants could not eat it up. The ripened crop after being harvested with the help of a sickle, they lay the crop down on the field in clusters. In this way, crop becomes sun-dried. Paddy straws left are burnt off so as to produce manure and destroy the pests for the next cultivation. The remaining paddy grains on the field are eaten up by the birds and mouse; the latter brings it to its underground home and preserve in the dry soil. In home on the thrashing floor smeared with cow-dung paddy is thrashed by hand. A pair of bullocks keeps running over these cereals and in this way, the grains

get separated from the straw. Then the straw and the grain are raised on separately into the store.

Rice was consumed in various ways, such as, boiled rice with salt, rice with pulses, vegetables and other non-vegetable items. They stored the rice in dry preserved condition. They first wet the rice, then fried it hot, and pressed in *chham* (husking machine) with *gyin* (leaver/handle) manually so that the rice portion came out from the seed coat; the seed coat was used both as manure and fodder; whereas the pressed rice, *chura*, was served with card which is till the most auspicious item for any kind of religious ceremony or festival for the Rajbanshis.

Males often performed their work on mutual understanding among the close relatives or neighbours. The same process of sharing the work could be again seen in case of child care; the villagers kept their children under the guidance of aged fellows in the village when both the genders went to the field (for serving the purpose of sowing, harvesting or thrashing). Males were also involved in preparation of wooden plough from good-quality non-degradable teak grown up reluctantly in the forest areas of North Bengal. Teak plough was also an important item for collection of bags of rice in the weakly market. Prosperous families did not let their women to go into the field and generally involved day labours or the male members of their joint families. From the dried straw of the paddy, the Rajbanshis still prepare sitting blocks and cautions, shade their roves, produce

guard rings of round-base earthen pottery and provide fodder and fuel. They use paddy straw on the fishing net with cow dung and superfluity; it helps in quick fishing in pond for an emergency. Airy hollow nature of the straw is good for controlling the home temperature in both hot summer and cold winter.

Table.1: major vegetables propagated by the Rajbanshis

| Vegetables | Example | Usefulness |
|---|---|---|
| Under ground/ semi-terrestrial crop | potato, yam, sweet potato, radish, carrot, beet, corn, ginger, turmeric, and *shalgom* (turpin) | uncooked radish, carrot, and beet eaten up as good source of vitamin; baked potato, yam and sweet potato consumed (under soil baking); sun-dried fried potato chips last for long; steamed and boiled potato are other food ways |
| Terrestrial vegetables | Brinjal, pumpkin, hemp, tomato, chilly, cucumber, cabbage, cauliflower, mint, bean, spinach, coriander, sop sop, panikumra (bottle | vegetable dishes helpful in meeting the optimal nutritional requirements; |
| | | long sized red hot *Siti* chilly variety is grown in Dinajpur area in huge amount; chilly preservation by drying it in the sun [occasionally after heating in warm water]; spicy taste of chilly controls body temperature in cold; |
| | | fibrous portion of the superfluity of these vegetables helps in curing constipation problem; |

| | | |
|---|---|---|
| | gourd), lafa [grown in winter-autumn] | rotten superfluity looks as good source of organic manure (compost); |
| Stem or/and leaves of herbaceous plant (*shak*/ *shag*) | *kheshari, rai*, mustard, spinach, lettuce, mint, cucumber, pumpkin, and *methi* (eaten up in winter) | good source of nutritious food; |
| | jute, flax, *brahmi, kalmi,bethu/bothua, puin, kankrol, notey* and red leaves [monsoon crop] | |
| | *oshni/sushni, khuria, helencha*, *amrul, gulancha, ol* (corn), *kalkeshut, kulekhara, polta,gima, hatishur, kiu, shanche, shafla, chikni, kundri, bhat* [young leaves edible] | good source of nutritious food; *Kulekhara* is a prickly plant and its leaf curry looks yellow in color; it helps in blood purification; *Shanche* is also important for nitrogen fixation in the soil; *Kundri* is another important plant in jungles of the hilly slopes with red; ovoid fruits [favored by parrots] and they are all edible in fried condition or as curry; *Bhat* with broad green rough leaves are needed in religious purpose and in young condition, are consumed as curry. |

Table.2: Bamboo[5,6] and its use:

| Plant | Plant | ways of use |
|---|---|---|

| | | |
|---|---|---|
| | parts | |
| Bamboo | Young shoot | edible; eaten up with young fern plant; used in pickle |
| | Stem portion | To make the bamboo stick durable, treatment is given with oil, sun heat, as well as mud and water inside the stagnant pond throughout the year. Bamboo sticks are used in balancing two baskets/ pots fixed on its both ends. It gives balance the boat in river. A house could be completely made up of bamboo that provides healthy environment and is cheap to construct. Bamboo Pulp is the raw material in preparation of paper. |
| | | Bamboo sticks of *nol* variety are also used for preparation of umbrella, flute and walking stick as well as for fencing the yard. |
| | | *Muli/ makla* variety of bamboo is good for construction of fence. Fences made of bamboo are used for privacy, for decoration, for livestock, storage and handlooms. Big-radius yellow bamboo shoots are used in thatching big baskets generally used for storage. |
| | | Long bamboo variety has closer joints (*gat*) and named as *lomba bansh.* It is used in making the frame and poles of a mud house/ a bridge on small streams and water canals. This type of bamboo is supposed to be very strong, not easy to cut into pieces and used in manufacture of musical instruments from hoary past. Holes are made at lower end of the bamboo shoot and set on fire;: in this way, the shoots are broken down |

| | | |
|---|---|---|
| | | automatically on the ground. |

Rajbanshis believe that prune plants give good production, but have lower longevity than the plants from fertilized seeds. They store the seeds or bulbs of good varieties in dried condition for the next year growth. When available, they try to generate a new plant from a cut stem or rhizome or leaf or root or the bulb. In nursery, they generate seeds and develop saplings in refined, shrub free, dried, stone free, nourished and fine soil beneath a thatched shade or plastic. The saplings are separated from each other and each of them is placed at somewhat piled soil so that the side channels could drain off the excess water effectively. In vegetable cultivation, Rajbanshis often apply an inversed funnel of the sticks for each creeper in the kitchen garden. They also use a common lattice. In pots, they sometimes grow more than one plant, maintain a balance between them and use wooden or bamboo stick to make them erect. In the garden, an ecosystem of its own is also developed there and its proper maintenance could help in controlling the pastes and weeds there. Instead of application of ash and other bio-toxicants as a protective measure from disease as well as cow dung, bone dust, rotten leaf and water emulsion of ash as the manure; the food web in the garden has itself a potentiality in disease prevention. The heat generating from ash pile or the rotten vegetables, leaves and weed is actually helpful

in incubation of grass snakes. Grass snakes are often found to warm up their body in the sun beams of summer near such culverts of the dry canals or boulder piles providing a quick passage into the darkness of hidden place rock shelter. These snakes do not harm man and help in controlling the population of frogs and rats in the garden. Rat is also good meal for cats. Birds like crow are also fond of frog and rat. Again the frogs are helpful in controlling the over increase of insects. The same work is done also by domesticated varieties of hen. Many other birds are involved in the same work; they hop upon the carpet of shed leaves; in this way, they search the hidden insects beneath these dry leaves and eat up them. Birds are there to clean up the superfluity and other dirt. In the monsoons, the situation has been little bit altered. The birds have built their nests with the materials like leaf fibers, dry branches and leaf. Some birds weave the leaves to form their nests. Some prepare their nests inside the corner of the house. Some do it in the coconut tree with the help of paddy straw or hey and the nest looks like an inverted lamp. Birds often catch the male firefly and fix them in a small piece of cow dung in their nest that provides light in the night. Sound of cricket is a common thing in the villages of North Bengal. It increases with quietness of the dark night. The stagnant water of rains is good for rapid growth of mosquito larvae, tadpole, larvae eating small fishes and diving beetles that prefer to eat the tadpoles. These small fishes are again consumed by fish eater small birds. However, the food chain in this ecosystem inside water is chiefly originated from rotten leaves acting as a good source of tadpole and larvae food. In mud; crab,

prawn and fishes with extra-respiratory organs are also found in large number. Snakes are also found in the tiny water streams. The snake number is again controlled by the domestic mongoose. Lizard, leech, green leech, fly, ant, spider, ant-like eight feet spider, big spiders without any net formation, large garden snails, apple snails, earth warm and centipede are other components of the garden. Ants are also of several types: very small red ants, small red ants, small tiny red ants, small black ants, small tiny black ants, big black ants, very big black ants and wood dwelling black-red ants (*kath pipra*). Size and shape of the colony, aggressiveness and action of the folic acid are different in case of these ants. Black ants often cut off green leaf and take the pieces to their holes where they use them in construction of chambers and propagate fungus. These fungus they feed some another minute delicate white insects (whom they bind up with mild fibers coming out of their mouth). From these white insects, they receive some milk like substance. Ants also act like scavengers. Small bird, honey bee, wasp and hornet are there to suck up the nectar. Wasp lays its egg inside the body of caterpillar and the wasp larvae take the nourishment from the body fluid of the latter. Butterfly larvae, living on green leaves, are also eaten up the bees as good source of protein and therefore a regulation on the huge quantity of the green leaves eaten up by these caterpillars has been restrained. Bees are again eaten up by the bee-eater birds and some spiders. Ants often eat up these larvae and insect eggs; but generally fail in battle with ant like spider. Spiders also hunt the caterpillars and the bees. Black small ants are fond of sweet taste and often found in the

dry calyx region of guava fruit. They produce a specific smell on the guava fruit. Birds like parrot often eat up the guava and other fruits. Sometimes, monkeys come down from the hills for the sake of food and fruit; they are highly attracted by the sweet smell of the *bel* fruit, but do not acquire the knowledge of how to break up the hard fruit coat and eat the inner portion; they detach these fruits and fall them to the ground. Snails are good reason for destruction of leaves and plants in the garden. These snails are often eaten up by birds that bring them up in the sky and from there, fall down them lower on hard ground so as to break the shell up. At night, when the snails come out of their shells; cats, night birds and porcupine eat their juicy soft muscular body parts. Green snakes are also found occasionally and they are very poisonous. Flower beds are also favorite target of the weed plants with deep and interconnected roots ranging from various types of grasses to Compositeae plants with flowers (actually inflorescence) containing numerous florets (minute flowers); the seeds are found to be gliding in the air through parachute mechanism and spread to a larger area. But of them bind weeds are the most aggressive and basically grow near the marsh land, canals and in the jungles seen from the road side, attractive for their beautiful colorful flowers, such as, violet flower of Convolvulaceae. Root Maggots, Wireworms, Cutworms and others are some harmful pastes in the ground; but they could be controlled by the ants, white ants, earth warm and other ground dwellers; they make the soil soft and sun soak. Garden is always filled up with shade shifting its place with time, sweet smell of flower in breezing wind, colored flowers and

decorative ornamental leaves as well as charming songs of chanting birds. Sound of crow and hen after the long dark night announces rising up of the sun. Big snail shells are found on the ground empty as their soft body part protrudes the dew-wet soft soil. Sweet smell of the night blooming white flowers immobilizes the clear air. And then the daily activity of human and the diurnal biotic elements of the garden ecosystem begin their daily work. Drip irrigation is very useful in summer to prevent the pot plants for dying from dryness. From the hole at the bottom of a hanged earthen round bottom pot, drops of filtered water are poured on the leaves, stem and soil; for filtration, a piece of cloth is generally used.

Table.3: major fruits propagated by the Rajbanshis

| Fruit Plants | Usefulness |
|---|---|
| Sweet fruit: jack-fruit, banana, papaya, pine apple, custar apple, fig, *chalta*, | These fruits are consumed as well as pickles are made out of these.<br>Sweet bananas of *chinichampa* with small and dark spots on their body are essential in religious ceremonies.<br>*Anaji* is the green banana used in curry.<br>*Sabri*, *Madna*, *Fans* and *Martaban* are some of the sweet varieties.<br>Banana local variety with seeds, *daya kela* or *bichia kela* (bichia= seed; kela=banana) at the green condition used in medicinal purpose (curing abdominal diseases and constipation). |

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| *bel* (wood apple) | The banana fruit inflorescence in the good variety of *Malvog* grows to the optimum level and therefore riches up to the soil. They cook the banana fruit inflorescence.<br>The leaf inflorescence is also cooked as a food item.<br>They use banana leaves as plates for serving food and also for packaging of various types.<br>*Bichia kela* is with medicinal importance: seeds are curative for worms, a glass of fresh water coming out of a young leaf inflorescence helps in stomach problems and it is the main item for the preparation of traditional food item *chheka*. The filtered water of sun-dried dust of subterranean rhizome of the plant coming out from the hole at the bottom of coconut shell provides waxy nature in the vegetables. Small *lafa* leaves grown in spring-winter are tastier and with this *chheka* the dish prepared is called pelka- it reduces body temperature and prevents the germs and dust to enter into the lungs through nostrils during thrashing the paddy throughout the weather-changing season of *Hemanta*.<br>Sun-dried fresh pieces of local varieties of small fishes in ponds and streams (*shutka*) are dusted in *chham-gyin* with waxy leaf-base of arum varieties (*mann/kala*). Mustered oil, garlic, chilly and turmeric are used to prepare fish-balls from this waxy fish dust (*sidal*). Balls are then fermented in tightly closed |

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| | earthen pots filled up with *chheka* dust. After 5/7 days, seal is broken up to release the balls then baked (*autha*) or cooked with curry and water of *chheka*. |
| | In order to ripen the banana in an artificial way, the Rajbanshis dig the soil up and create some alternate layers of banana wrapped in banana leaves stored within and dry paddy straw alternatively. Then the system is fired in after covering it with soil from above. It acts as a closed kiln chamber where the wind is blown inside by a hollow bamboo pipe pierced through the soil. From the heat, the bananas inside gradually ripen within approximate four hours duration; paddy straws kept within behave like burning substance as well as the non-conductor elements inside the soil chamber. Herdsmen often cook sweet potatoes in this manner; but the chambers they use are small and eat the potatoes hot. |
| | For washing the clothes, Rajbanshis use soda which they produce from the base of the banana tree (this base is the actual portion from where the leaf inflorescence comes out as "the tree" from the underground rhizome). They submerge this trunk base for long in water and when it started to be rotten out, the waxy extract they collected and used as soda. In burnt body part, immediately after the burning, the extract from the basal region of the banana |

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| | leaf inflorescence (or the 'stem') has to be rubbed so no mark would appear there and complete remedy is possible. |
| | Green jack-fruit is eaten as vegetable and the ripen sweet fruits are too tasty; birds and jackals love to taste it. |
| | Papaya could be used as delicious fruit, good vegetable, clotting blood, latex production and so on. This species has some variety with two or even more branches each yielding numerous fruits. |
| | Pine apple previously cultivated in homocentric circles around trunk of a big mango tree shade; fruits are edible, waste products source of good compost; preserved in juice and jelly forms. It is an important commercial fruit and peasants are more interested in row wise pineapple cultivation facilitated by proper drainage system than private small scale tea gardens. |
| Sour fruit: guava, lime, peach/ lack berry, carambola, tamarind, *zambura*, green mango, | Rajbanshis never eat the soft, pulpy, juicy and sweet mango, because they consider ripened mango rotten in nature. They are actually fond of the sour taste of lime, carambola, tamarind, *zambura*, and green mango. They first rub the mango at its tip on the bark of the tree to remove the bitterness, halve to remove the seed, rough and consume it with salt. They also piece these green mangos and dried them is sunlight of the summer with salt and edible mustered oil or oil seeds in order to preserve them as pickle. |

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|---|---|
| tamarind, *chalta* | |
| Pickle yielding plant: buguri (plum) | sour fruit; several indigenous varieties present; wild variety (bon buguri), small sized, medium sized, broad sized, minute sized; pickles made of both green and ripened fruits, often the fruits are sun-dried before preserving them as pickle; dried fruits are often dusted and then used as pickle |
| Other pickle yielding plants: pine apple, mango, amlaki/aml, tamarind & carambola. | pine apple pickles in both green or ripened conditions; mango, tamarind & carambola pickles either sun-dried (oil, sugar and salt added) or submerged in mastered oil. |
| | mango juice with the mesocarp fibers is preserved under sun heat and day by day the jelly layer is got thicker. |

Rajbanshis also cultivate wheet in winter, cron in winter and summer, rapeseed in winter, tobacco in some pockets of CoochBehar district in winter-autumn and jute in summer-monsoon. Rajbanshis are associated with cultivation of a diversity of around 80 vegetables, rhizomes, chilly (2 exclusive varieties: *dhani* and *siti*), potato (*alu, gol alu, mati alu, ranga alu, bon alu*), sweet potato (*Ipomoea batatas*), different types of gourd,

ferns (young inflorescence- *dhenki*) and other herbs growing in crop field, kitchen garden, road side, bush and jungle.

***Water Management:*** Rajbanshis in some regions cultivate the crop in island like plots, often created artificially in the big ponds or water tanks connected with the mainland by a temporary bamboo bridge. They in the rainy season often go in paddy-cum-fishery cultivation. The small fishes in the watery paddy field sometimes eat the harmful larvae of beetles and dragon flies. These small fishes die with water evaporation and their body remains after their death rote to add manure and phosphorus to the ground. *Gappi, Techokha* and other fishes the farmers never harm as these are basically mosquito larvae eaters. The water grass is considered to be good fodder for the cattle. Water hyacinth grows up in the low marshy land or slow water flows and creates a different type of water ecosystem on muddy soil. This type of stagnant water is good for production of mosquito larvae and larvae-eating small techokha fish. These fishes die off due to excess of use of oxygen, maximum growth of planktons and pollution. This again gives an invitation to the insectivorous birds as well as fish eating small birds. The mud digging birds get highly affected by teniasis. The water hyacinth is often cut off and then sun dried before burying them under the soil which gives a very good quality of manure. Rajbanshis have the concept of private and public ponds in the village. Of the public ponds, they often

maintain the concept of good or bad pond: pond for bathing, to wash the clothes, for religious occasion or for other or no use. The houses often contain each a ditch/pond where arum grows up reluctantly (renowned for both food and medicinal values). In the dry season, these ponds are found to be full of green or violet phyto-planktons. High edge ponds consist of big trees around. These trees with help of their strong roots check soil erosion, suck the excess pond water, and check excess water evaporation in summer by forming big shadows. These trees are placed at a safe distance, so that the shed-off leaves could not pollute the water. Grass is also used for prevention of soil erosion. Existence of separate pond for cattle is very scientific; in this way, the parasitic cycle through pond, cattle and man could be checked. Rajbanshis also use their waterbodies, river streams, and marshlands for fishing; they cultivate mud fish, crabs and prawns, sweet water fish and also preferred small fishes locally available that they call *nadiali*.

***Livestock management:*** Rajbanshis often maintain large-scale poultries of duck alternative to rearing and consuming hen. Whether hen or duck, they generally make the poultry farm or the cage above some heights from the floor [so as to reduce the chances of adverse effects from water, cold, snake bite and attacks of other bird-and-blood easting animals]. They use paddy straw, especially for the chicks to protect them from cold. Domesticated hens are often helpful in controlling the beetles, other insects and excess

amount of earth warms in the soil. Ducks control the excess amount of snails in the pond eco-system. Stool of the duck is very important for feeding the fishes inside the pond. Rajbanshis often consume the fresh egg yolk uncooked. Rajbanshis also rear goose. Rajbanshis are also fond of wild hens. Rajbanshis used to keep the superfluity of food substances for the small birds from the neighboring jungles and the village ecosystem comprising of so many trees or bamboo bushes. These birds were very useful in pollination, seed germination as well as controlling the insects and pastes. Such superfluity is also applied in fishery for feeding the fishes. Some birds are there that collect insects and larvae from the ditches and thus helping in to maintain the eco-system of the ponds. Fish eating small birds and other migratory birds are also there that play important role in controlling the water ecosystem and many of them use the marshlands as their breeding places. Predator birds and owl help in controlling the number of rats, frogs and snakes, whereas other common birds regulate the number of insects, mosquito, fly and larvae. Bird and bat stool is one kind of natural manure. Scavenger birds are also there that eat the dead remains of domesticated animals and thus balancing the eco-system. Again, birds often eat the ripening crops and thus causing negative effect.

Rajbansis also use rapeseed remains, paddy straw, rice emulsion, jungle leaves, various types of grass, old *makoi* (corn grain), leguminous plant leaf including cowpea, bad smelling marua (millet) and if available *gur* (solid crystallized sweet cake of cane). *Gagal* leaf as fodder is collected from the creeping vegetation inside the jungle to

increase the amount, quality and taste of the cow milk. Besides cow, Rajbanshis rear goat and buffalo. Cow and buffalo are also applied in ploughing and traditional transportation. Cow dung is used for dry manure, fuel cake, pluster and goat manure as manure cum pesticide. Cow dung as manur is often used along with various plant extracts, water, paddy straw and as compost. Cattle are the source of milk, horn, bone dust manure, skin and meat also; but cow is not consumer by the Hindu rajbanshis for religious causes. However, manure is a good instance of recycling the bio-degradable products.

***Seed Management:***

A. Seed Management Programme (descriptive)-

1. Seed soaking: in a wet jute bag submerged under fresh pond water whole night
2. Spreading the soaked seeds in prepared nursery bed on highly fertile river soil clay
3. Taking seedlings to another bed, sowing there in close, 4-5 in each bunch and let become sapling (process: *Roya lagano*)
4. Taking saplings to the main prepared cropping ground (small farming labour intensive unit), sowing there in row of their choice, 3-4 in each bunch, irrigating from time to time, protecting from weeds and pests and waiting for cropping (process: *Boilan*)

5. Regular visit to the field, hoping not for thrashing rain when grains are coming out, but pleasant weather
6. Sowing at early morning or late afternoon (shadow)
7. Irrigation 2-3 times
8. Seed soaking can also be with *Trichoderma viridi*
9. Application of organic manure thrice: during ploughing, leveling and first irrigation
10. Final sowing in mud water field with little holes (process: *Jo*)

B. Seed Management Programme (diagnostic)

1. *Bosumoti Laxmi* worship (basic features- on field; family oriented; with candle-banana-sacred rice; cutting off of 3-5 bunches; offering to household deity and consumption of this early paddy; indigenous testing of paddy as it starts to ripen; prediction of yield and quality);
2. *Nabanna* festival (social festival, complete ripening of paddy in spring, successive harvesting and thrashing and stock raising throughout pre-winter when dews drop into mother earth; temperature is rapidly falling with moderate humidity in air)

C. Seed Management Programme (Applied)

1. Keeping the stalk in bamboo basket
2. Basket plastered with cow-dung- dried out (natural preservative)
3. Put *Azadirechta* dried leaves (*neem*) inside

4. Covering with a fresh piece of cloth
5. When needed, taking out bowls of paddy and making rice seeds out of this
6. Time to time sun-treatment
7. Storing next year seeds
8. Individual seed bank on household basis

List of vegetables and means of propagation

| English name | Native name | Scientific name | Propagation |
|---|---|---|---|
| Cabbage | *Bandhakopi* | *Brassica oleracea var capitata* | seed |
| Cauliflower | *Phulkopi* | *Brassica oleracea var botrytis* | seed |
| Kholrabi | *Olkopi* | *Brassica oleracea var gongyloides* | seed |
| Chinese cabbage | *China kopi* | *Brassica chinensis* | seed |
| Petsai | *Nati shak* | *Brassica chinensis* | seed |
| Saishin | *China shak* | *Brassica parachinensis* | seed |
| Mustard green | *Sarisa shak* | *Brassica campestris* | seed |
| Turnip | *Shalgom* | *Brassica rapa* | seed |
| Radish | *Mula* | *Raphanus sativus* | seed |
| Brussels sprouts | --- | *Brassica oleracea var gemmifera* | seed |
| Water cress | *Sachi* | *Nasturtium officinale* | seed |
| Pea | *Motor* | *Pisum sativum* | seed |
| Hyacinth bean | *Sheem* | *Lablab niger* | seed |

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|---|---|---|---|
| String bean | *Barbati* | *Vigna sesquipedalis* | seed |
| French bean | *Jhar sheem* | *Phaseolus vulgaris* | seed |
| Winged bean | *Kamrana sheem* | *Psophocarpus tetragonolobus* | seed |
| Sword bean | *Makhan sheem* | *Conavalia ensiformis* | seed |
| Lima bean | *Rukuri* | *Phaseolus limensis* | seed |
| Vegetable soybean | *Soyabean* | *Glycine max* | seed |
| Tripatri leaves | *Tripatri shak* | *Desmodium trifolium* | seed |
| Yam bean | *Shakalu* | *Pachyrrhizus tuberosa* | seed |
| Sweet gourd | *Misti kumda* | *Cucurbita maxima* | seed |
| Bottle gourd | *Lau* | *Lagenaria siceraria* | seed |
| Wax gourd | *Chal kumda* | *Benincasa hispida* | seed |
| Cucumber | *Shasa* | *Cucumis sativus* | seed |
| Cucumber (short) | *Khira* | *Cucumis anguina* | seed |
| Ribbed gourd | *Jhingga* | *Luffa acutagula* | seed |
| Sponse gourd | *Dhundul* | *Luffa cylindrica* | seed |
| Bitter gourd | *Ucche/Karala* | *Momordica charantia* | seed |
| Teasle gourd | *Kakrol* | *Momordica cochinchinensis* | seed |
| Palwal | *Patal* | *Trichosanthes dioica* | seed |
| Snake gourd | *Chichingga* | *Trichosanthes anguina* | seed |
| Squash | *Squash* | *Cucurbita pepo* | seed |
| Muskmelon | *Banggi* | *Cucumis melo* | seed |
| Ivory gourd | *Tala kuchi* | *Coccinea cordifolia* | seed |
| Snap melon | *Futi* | *Cucumis melo var momordica* | seed |
| Oriental melon | *Chinar/Banggi* | *Cucumis melo* | seed |
| Watermelon | *Tarmuj* | *Citrullus lanatus* | seed |

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| Potato | *Alu* | *Solanum tuberosum* | bud |
| Brinjal | *Begoon* | *Solanum melongena* | seed |
| Tomato | *Tometo* | *Lycopersicon esculentum* | seed |
| Sweet pepper | *Misti marich* | *Capsicum annuum* | seed |
| Chilli | *Jhal marich* | *Capsicum species* | seed |
| Okra | *Dhedosh* | *Abelmoschus esculentus* | seed |
| --- | *Laffa* | *Malve verticillate* | seed |
| Rozelle | *Chukur* | *Hibiscus sabdariffa* | seed |
| Stem amaranth | *Danta* | *Amaranthus lividus* | seed |
| Red amaranth | *Lalshak* | *Amaranthus gangeticus* | seed |
| Spiny amaranth | *Katanotey* | *Amaranthus spinosus* | seed |
| Leaf amaranth | *Noteyshak* | *Amaranthus viridis* | seed |
| Haicha | *Chanchi* | *Alternanthera sessilis* | seed |
| Indian spinach (green) | *Puishak (sabuj)* | *Basella alba* | seed |
| Indian spinach (red) | *Puishak (lal)* | *Basella rubra* | seed |
| Spinach | *Palonggshak* | *Spinacia oleracea* | seed |
| Beet | *Beet* | *Beta vulgaris* | seed |
| Goose foot | *Bathua* | *Chenopodium album* | seed |
| Marsh herb | *Helencha* | *Enhydra fluctuans* | seed |
| Lettuce | *Lettuce* | *Lactuca sativa var. capitata* | seed |
| Water spinach | *Kolmi* | *Ipomoea aquatica* | seed |
| Kangkong | *Gima kolmi* | *Ipomoea reptans* | seed |
| Sweet potato | *Misti alu* | *Ipomoea batatus* | bud |
| Carrot | *Gajor* | *Daucus carota* | seed |
| Indian penny wort | *Thankuni* | *Centella japonica* | seed |
| Parseley | *Parseley* | *Petorselinum crispum* | seed |
| Celery | *Celery* | *Apium graveolens* | seed |
| White yam | *Matey alu* | *Dioscorea alata* | bud |

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|---|---|---|---|
| --- | *Pesta alu* | *Dioscorea bulbifera* | bud |
| Cassava | *Shimul alu* | *Manihot esculenta* | bud |
| Eddoe | *Mukhikachu* | *Colocasia esculenta* | bud |
| Tannia | *Dudkachu* | *Xanthosoma violaceum* | bud |
| Tannia | *Moulavikachu* | *Xanthosoma atrovirens* | bud |
| Giant taro | *Mankachu* | *Alocasia macrorrhiza* | bud |
| Elephant foot aroid | *Olkachu* | *Amorphophallus campanulatus* | bud |
| Drumstick | *Shajina* | *Moringa oleifera* | seed and stem |
| Plantain | *Kanchkala* | *Musa paradisiaca* | bud and rhizome |
| Green papaya | *Papay* | *Carica papaya* | seed |
| Bunching onion | --- | *Allium fistulosum* | bud and bulb |
| Asparagus | *Asparagus* | *Asparagus officinalis* | bud and bulb |
| Sorrel | *Tak palangg* | *Rumex vasicarious* | seed |
| Jute leaf | *Patpata* | *Corchorus capsularies* | twig and seed |
| Water lily | *Shapla* | *Nymphaea stellata* | bulb |
| Giant carandilla | *Sheeta lau* | *Passiflora quadrangularis* | seed |
| Immature jack fruit | *Echad* | *Artocarpus integrifolia* | seed |
| Baby corn | *Choto bhutta* | *Zea mays var. saccharata* | seed |
| --- | *Malencha* | *Jussiaea repens* | seed |
| Wood sorrel | *Amrulshak* | *Oxalis europaea Jord* | seed |
| Garden purslane | *Nunia* | *Portulaca oleracea* | seed |
| Fern | *Dhekishak* | *Dryopteris filix-mas* | rhizome (and spore) |

*What the result comes out from traditional seed treatment?*

- *Swarna* gives a greater yield (about 18-20 *maund*[7]*/ bigha*[8]), while the lowest is documented in case of *Kalam* (8-10 *maund/ bigha*). But *Kalam* is the rice with elongated grains of thin size and also of good taste.
- *Tulaipanji* is of international quality. It can be projected as Kola rice of Assam.
- *Nunia* rice is famous for its fragrance. Black (*kalo*) *Nunia* is a special case.
- FV (farmers' variety) rice seeds are highly viable, if managed properly.
- Small scale farming is associated with poverty and subsistence, but it is labour intensive, low-coast, higher crop intensity, constant and stable yield, local market oriented and no extra coast is needed.
- FV seeds of Rajbanshi rice cultivation system is associated with ecological, economic and social sustainability apart from jute, sericulture and other commercial cropping
- After harvesting, paddy field can be burnt and other crops can be propagated using no extra manure: cow pea, vegetable (low-land), crops of dry season and even cashew nut can be tried.
- Except tilling and ploughing, women are highly associated with all per-, post- and main agricultural activities.
- Rajbanshis preserve seeds, bulbs and buds in dry condition in dark and cool place. They at a time used earthen rattles (*jhunjhuni*) as closed chamber to store these seeds. In the right season, they broke down it and recollected the seeds before sowing in pot, nursery and directly into the field.

- Paddy of rainy season is a direct crop after the jute has been harvested for fibers. Jute is a summer time crop and at its age of 120 days is cut off from the field. But now a few jute plants let to grow up in the rains and their twigs of 6 inches are again cut off obliquely and applied in dry upland with a facility with good drainage system. Jutes are flowering in late monsoons and in spring season its seeds are collected and stored for next autumn-summer. But this process is rather contemporary.

In post-paddy winter season, weed in controlled in vegetable ground by intercropping. Selective weeding is also there. *Dandakalash*, *surjasisir*, ferns, Compositeae and arum also grow up in different seasons around the crop field, pond side and by bamboo bushes. Weeds are so many, but the most prevalent are *dubba* and *mutha* grass, big leaf *dudhkumari* and triangular stem *bindi mutha*. Paddy witting machine is an important input. Often plough is applied in between the paddy rows. Water is good for several friendly algae like *jhajhi*. *Dandakalash*, *surjasisir*, ferns, *Compositeae* and arum also grow up in different seasons around the crop field, pond side and by bamboo bushes. Farmers do not destroy *thankuni* or *manoboni* with medicinal values growing reluctantly.

***Conclusion***

Rajbanshis actually know the best that how to reserve the bio-diversity and utilize the same without their excess exploitation. Their cultural values and sentiments are completely directed towards the maintenance of the equilibrium between population size

and minimum exploitation of the resource to meet the energy requirement. They may oppose the complete hegemony of the modern market economy and their cultural values and social norms would back behind the traditional politico-economic systems and provide protection to the IKS. Culture lag may allow social change, but it looks impossible for a complete transformation towards absolute consumerism. Here the indigenous varieties of rice, jute, arum and bamboo are all utilized in various ways; therefore proper knowledge about their utility would help in their conservation, maintenance of the genetic base in biodiversity and Global Public Service.

***Notes***

1. Respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities embodying traditional life-styles relevant for the conservation and sustainable use of biological diversity. [Article 8(j) of the Convention of Biological Diversity (Rio, 1992)]

2. "Development agencies should place greater emphasis on, and assume a stronger role in, systematizing the local knowledge base--indigenous knowledge, 'gray literature,' anecdotal information. A vast heritage of knowledge about species, ecosystems, and their use exists, but it does not appear in the world literature, being either insufficiently "scientific" or not "developmental."- *U.S. National Research Council* (1992: 10)

3. Dipterocarpaceae (*Dipterocarpus*, *Shorea, Hopea*); Combretaceae (*Terminalia* spp., *Quisqualis indica*, *Combretum*); Palmaceae, arum, rhizomatous plants and ferns are the representatives of Indo-Malayan flora in northern West Bengal. Grasslands of *Sachharum* (kash), *Phagmrites*, *Arundo-donax*, *Typha* denote the affinity with the Savana vegetation of Africa. Plants are there on high altitude Himalayan valleys and slopes similar to those of Alps.

4. Rajbanshis have good knowledge about what these local birds eat, how they live, where hatch egg in wild and how rare the chicks; they believe in the presence of paradise birds: *Bangoma* and *Bangomi* (*bekma* and *bekmi*). On magico-religious to religious ground, importance has been given up on fish, snake, tortoise, rivers, bird: connectivity is there with the concepts of ancestors' sprit, soul, graveyard, megalith, *Shiva Lingam*, fertility cults, ghosts, angels, malevolent and benevolent entities, deities, black magic, witchcraft, music, musical instruments, song, dance, ornaments, clothing, alcoholism, sexual behavior, *tantra*, sacrifice, medication, mantra, Sun and fire, day and night, heaven and hell, non-violence and violence, peace and war, defensive and aggressive attitude, hunting and gathering, fishing, domestication and trade, handlooms of wood, bone, bamboo as well as jute mattress (*dhokra*) and clothing (*dokna*) prepared all manually with traditional technologies.

5. Flowering in bamboo vegetation is a threat to the peoples dependent on bamboo economy. Because, it would destroy the total bamboo variety at a time and a new variety

with some altered genetic configurations would arise from the seeds of pollinated bamboo flower. Cultivators would be also threatened at that time due to rapid intrusion of rats into the dying bamboo bushes (as being allured by the nourished fruits and seeds) and their subsequent attack over agricultural sector causing a situation of starvation. Sudden increased need of owl and snake is therefore felt to control the rat population.

6. The slopes of uplands are often found covered with ferns of numerous types, some being highly edible and nutritious. Women are involved in collection of the newly grown leaves which they cook as their daily vegetable. These Rajbanshi womenfolk have the capability to use their fingers very swiftly with the very consideration that the leaves do not have sores. Such capabilities are highly required in tea gardens so as to collect the young tea leaves with buds. But still now, no one of Rajbanshi womenfolk is interested in accepting the job of leaf collection in tea gardens. They prepare delicious dish of fern with young tips of new bamboo shoots; for the latter, they cover the outcoming shoot from subterranean rhizome under a earthen pot.

7. The *maund* is the anglicized name for a traditional unit of mass used in British India, and also in Afghanistan, Persia and Arabia: the same unit in the Mughal Empire was sometimes written as *mun* in English. In British India, the *maund* was first standardized in the Bengal Presidency in 1833, where it was set equal to 100 Troy pounds (82.28 lbs. av.). This standard spread throughout the British Raj. After the independence of India and

Pakistan, the definition formed the basis for metrication, one *maund* becoming exactly 37.3242 kilograms. A similar metric definition is used in Nepal.

8. In West Bengal, the *Bigha* was standardized under British colonial rule at 1600 sq. yd (0.1338 hectare or 0.3306 acre); this is often interpreted as being 1/3 acre (it is precisely 40⁄121 acre). In Metric units, a *Bigha* is hence 1333.33 $m^2$.

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FIG1: RELATIONSHIP OF **INDIGENOUS RIGHTS** with other fields like TECHNOLOGY (A), KNOWLEDGE AND BIO-PIRACY (B), PROPERTY & RIGHTS (C), various forms of CAPITAL (D), SUSTAINABLE DEVELOPMENT (E), FOLK LIFE & INDIGENOUS PEOPLES (F), BIO-DIVERSITY & its MANAGEMENT (G) & GLOBALIZATION (H)

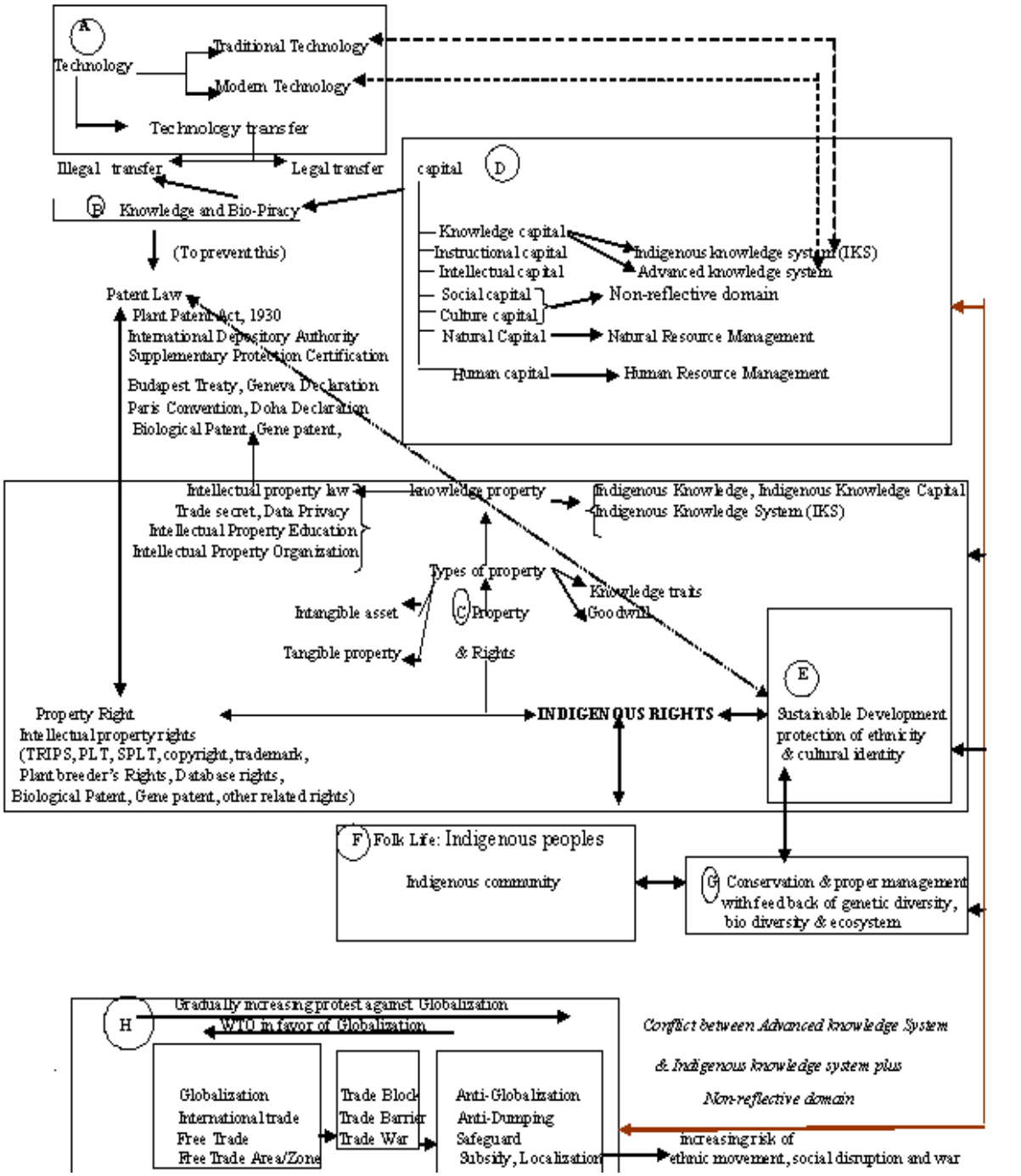
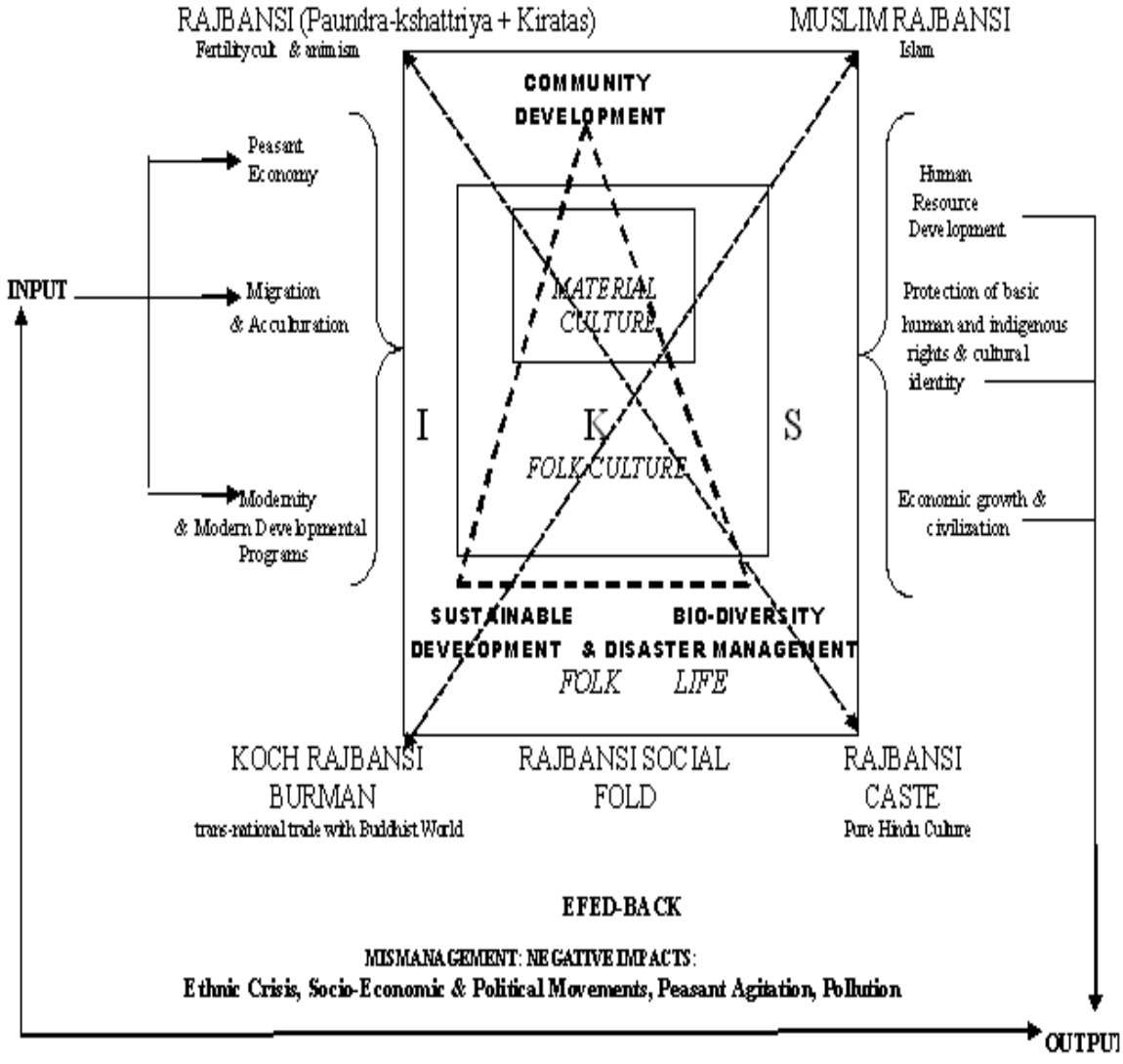


**FIG2: Relationship among community development, sustainable development, and biodiversity-cum-disaster management with respect to IKS of Rajbansi Social Fold: Orientation of IKS around their material culture, folk culture and folk life: Response to various types of INPUT, OUTPUT and FEEDBACK: NEGATIVE or POSITIVE RESPONSE due to mismanagement or proper management during the feed-back process**




*PROPER MANAGEMENT: POSITIVE IMPACTS:*
*Economic Development, Protection & Suitable Use of Natural Resource*
*in Controlled Way, Multicultural*
*Atmosphere, Agro-Based Industry, Urbanization, Large-Scale Industrialization*

Box1: Festivals symbolizing inner meaning of the behavioral expression: Communication with ecology, nature, technological aid & the dependence on super-nature: need to fulfill the energy requirements of a given population: domestication, alternative economy and folk life:

1. Modon Kam- journey from love to devotion/ summer

worship of seven poles symbolized for seven different means is performed. Each of the poles is wrapped in colorful cloth, covered atop by yak tail (*chamor*), and carried by men wearing clothe of women with bells, drums and clappers. This day-ritual requires blood sacrifice (old customs and magical belief)

The Seven Symbols

[*Bishahari*: worship of snake goddess: snakes symbolize water flows in dense jungle of North Bengal: ancient water ways once regulated by fishermen-cum-agriculturist communities: snakes come out from hibernation in summer when area of jungle is cut off and fired to clean up for Sweden cultivation with the first drop of monsoon rains]

[*Salshwari thakur*: animism, tree worship held by men, symbolizing male deity; protection of hunter-gatherers in forest from fierce animals: burnt jungles received summer sun beams destroying the pests within the ash heap good for Swedish

cultivation]

[*Tista Buri*: animism, female deity, river and rive ways, trans-national trade, fishing, agriculture, wealth]

[*Modon pir*: notion of egalitarianism and freeness in the society, symbol of syncretism within *Sufi* Islam with Buddhism and Vaishnava sect in Hinduism (prayer to such Wisemwn or *pir* asking for social integrity has become ritualistic, such as, *Satya pir*, *Pagalo pir* and so on]

[*Goram*: for wellbeing of the village, with a notion of rural society as an entity of peoples' activities, identity, culture, and solidarity with nature and supernature]

[*Kali*: female fertility cult, part of ancient *tantra* of pre-Aryan magico-religious tradition and fertility testing incorporated later in mainstream Hinduism, female entity of nature, controller of time scale, savior from the enemy, the Mother, symbol of matriarchy in primitive societies, Goddess for prevention of any difficulty and contamination of diseases during weather changing and blood sacrifice]

[*Sanyasi*: mentor, saint, Wiseman, protector: symbol of devotion, medication, knowledge, ethno-medicine, truth, cult of *Shiva*, *Mahakal* and *Buddha*]

2. *Tista Buri*/ summer

Worship of the river Tista (Teesta) with a wish to have a better new year with good health and prosperity as well as good soil precipitation during the next monsoon with a hope for

good cropping of the lowland monsoon crops in Teesta floodland.

3. *Mechheni Khela*/ summer

wife of fisherman with fish in pot goes to all household in the village,sings songs and prays for wellbeing. This is a kind of showing solidarity, feminity, and the folk life on and side of river (fishermen-cum-agriculturist). In the folklore of *Manasa*, the snake Goddess, a conflict between the snake worshipper fishermen and traders using the river routes is still recalled and this is the main theme of the song.

4. *Gram Thakur*/ summer

in each home in or near the bamboo bush, in order to reduce the effect of malevolent deities and other spirits, worships to various forms of the female Goddess *Kali* and the Supreme God, *Mahakal* or Shiva without any image are performed with sacrifice, other offerings, use of vermillion, and establishment of *than* (the place where the deities reside)

5. *Gochibuna*/ monsoon

This is associated with preparation of seed bed, checking the seed fertility, tealing and ploughing the soil (if necessary), sowing saplings in late summer when monsoon begins

6. *Hudumdeo* & *benger biao*/ monsoon

first one is the magico-religious worship to the cult of *Hudumdeo* by the womenfolk at night in crop field with rain dance around the image that they build: nude dance as a magical practice done at the primary stage of drawing with dancing, singing, music, play and other things to appease nature; second one is the marriage giving ceremony of frogs as another magico-religious performance seeking timely raining to crop the monsoon varieties of rice and vegetables

7. *Amti*/ monsoon

at the beginning of monsoon, children performed the festival and they have a belief that excess yield of mango (*aam*) in summer would be an indication to heavy rainfall in monsoon season causing flood; untimely flooding can be fatal to lowland monsoon rice cultivation and rice nurseries; but late rice cropping on river silts and clayey loam can be really helpful for good rice cropping.

8. *Dhaner ful ana*/ spring

females prey so that ears could come out in paddy

9. *Lokhir dak*/ spring

the time when ears of paddy come out first, a *dhan bari*, made up of jute stick, is constructed with two earthen bells at the top and the headman in the family prays for good

yield with milk, plantain and dry pummel leaves at night in the light time and shouting songs

various major female fertility cults are worshipped: *Debi, Boro Debi* and *Bishohori* (Goddesses of Wisdom) as well as *Bhandani*-on-tiger. The latter clearly indicates to the relationship of Rajbanshi people with jungles of Duars foothill and Himalaya to the north

10. *Uttar ekadashi*/ spring

restricted way of life and fast for the whole day in the honour of *Shiva* and then on the next full moon, *Rash purnima*, a Vaishnava festival, is organized;

worship of snake goddess (*Monosha*) with songs and dances with exclusive musical instruments is performed; major venomous snakes are *laudigi, kharis, gokhuro, sankhachur, gendabhanga, shiarchanda, panbora,* and *chandrabora*, besides *azgar* (python);

worships of other female deities are also performed- *Chondi, Than Chondi, Kali*;

cow worship (*Goru Chumani*) is also there- bathing and feeding the cow after horns are smeared with vermillion

11. *Dhan katar puja*/ after spring

senior wife of the house goes alone to the field at night, cuts handful of ears and binds it on door of the bedroom- the process symbolizes that *Laxmi*, the goddesses of wealth comes into home; regular harvesting from the next day- bunches kept 2 days in the field so that all the leaves could be shed off and then piled up in *kholan*/ the thrashing floor

12. *Naya Khoi*/ after spring

Thrashing also started and the first amount of husked rice used in preparation of some precious rice foods to be offered to the deity

13. *Khet Uthani*/ after spring

magical practice, cow/ buffalo horn on a stick driven in the empty field covered by a bunch of paddy straw to keep aside any evil view

14. *Pushuna*/winter

For the whole month of *Poush*/ the first month of winter in Bengal thrashing in performed; stocks raised and rice husked; on the last day, rice cakes prepared from the rice dust;

Image of fox worshipped

15. *Shiv Ratri*/winter

For the month of *Magh*, the last month of winter, no major work performed, vegetables

grown reluctantly, *Maghli Shinan* or bathing in the water of sacred rivers at certain places where they flow northwards, inviting the peoples of north and their caravans coming down at the plains during Winter-and-Autumn through the steep hill passes and river valleys (?); pray to *Shiva* and various fertility cults attached with Him; at a special day, *Shiva* being worshipped throughout the whole night- all people participated

16. Autumn festival- At the month of Autumn, when new leaves come out after prolonged period of winter, worship of the male forest deity, *Shaleshwari* and *Rakhal Thakur* (the shepherd boy); bharar ghar chhuba or the worship of animal herd in domestication performed that reminds the *Goru chumani* festival on after-spring; at the year end, various festivals organized to wish good things in next year: worship of *Gorokhnath*, one of the pathfinders of Nathism, an egalitarian version of Hinduism with the provision of self defense- originated in North India but more successful to spread in eastern part of the Sub-Continent when Islam was rapidly spreading over Bengal at the post-Buddhist period; *Chorok*, the month long festive of Shiva with *Gambhira* songs and Gajon/ self-healing by the side of *Gamira* worship (Vaishnavism); forest burnt off for next-year shifting cultivation: males entere in jungles with whatever weapons they have in hands and have to kill at least one edible animal that is to be cooked and eaten within the forest area (hunting festival: *Bishau*); success would decide the fortune in the next season; throughout the season, ethno-medicines taken; dham or homestead worshipped in the honour of major

deities (Shiva, female cults and *Laxminarayana*) with *Gidal* singing songs with musical instruments for whole weak without any interruption

17. Jurabandha/ friendship with tree

These festivals, exclusively within a rural atmosphere and agro-ecosystem, have played major role in keeping the Rajbanshi Folk Life intact which is again dependent up on the public service of their IKS. At the same time, IKS of the Rajbanshi Social Fold is quite efficient to deliver handful of information about agro-ecosystems and biodiversity of the region.

Appendix1: Some non-agricultural plants around agro-system of North Bengal- local & scientific names:

Plants: aparajita (*Clitoria ternatea*), gulmohar (*Delonia regia*), bel (*Aegle marmelos*), aam (*Mangifera indica*), amra (*Spondias pinnata*), ashok (*Saraka asoka*), brahmi (*Bacopa monnieri*), bon tulsi/ (*Hyptis suaveolens*), babul (*Acacia nilotica*), chor kata (*Andropogon aciculate*), palas (*Butea* spp.), pipal (*Ficus religiosa*), khetraparpati (*Oldenlandia corymbosa*), pakur (*Ficus infectoria*), dumur (*Ficus benghalensis*), yagya dumur/ gular (*Ficus glomerata*), chalta (*Dillenia indica*), khoir (*Acasia catechu*), tea (*Camellia* spp.), nagkeshar (*Meusa ferrea*), sal (*Shorea robusta*), piyal (*Buchanania lanzan*), pepe (*Carica papaya*), chalta (*Dillenia indica*), jalshingara/ paniphal (*Trapa*), chalmugra (*Gynocordia*), jat neem (*Azedirachta indica*), neem (*Indigofera tinctoria*), buguri (*Zyzyphus mauritiana*), boyar (*Zyzyphus jujuba*), labanga (*Zyzyphus aromaticum*), jambura/ timbur (*Zanthoxylum* spp.), ashphal (*Dimocarpus longan*), ghas (*Aronopus compressus*), joan (*Trachysperous ammi*), jhika (*Lannea coromandelea*), dhudhul (*Luffa aegyptieaca*), amla (*Embelica officinale*), chikrasi (*Chikrassia tabularis*), muktajhajhi (*Acalypha alba*), *Acalypha indica*, tetul (*Tamarindus indica*), peyara (*Psidium guajava*), jamrool (*Syzygium samarangense*), hatishur (*Helianthus indicum*), karkatashringi (*Rhus* sp), rudraksha (*Elaeocarpus serratus*), hartaki (*Terminalia chebula*), chilauni (*Schime wallichii*), hingul (*Balanites aegyptiaca*), *Murraya koenigii*, kamranga (*Averrhoa carambola*), nagbeli (*Lycopodium elevatuin*), akashbeli (*Cascuta* sp.), babul (*Acasia nicotina*), kolke (*Thevetia neriflora*), kash (*Saccharum spontanium*), ghas (*Melocanna baccifera, Thysannolaena,Gleichenia pectinata),* shephali (*Nyctanthus arbortristis*), gajor

(*Daucus carrota*), mula (*Raphanas sativus*), bhang (*Cannabis sativa*), ganja (*Abrus precatorius*), pan (*Piper betel*), tejpata (*Cinnamomum zeylanica*), tamal (*Cinnamomum tamala*), karpur (*Cinnamomum camphora*), sajina (*Moringa obleisera*), pipal (*Ficus religiosa*), bot (*Ficus benghalensis*), *Spathodea campanulata* (rhododendron of the plains), simul (*Bombax ceiba*), kapok (*Ceiba pentandra*), bakul (*Mimusops elengi*), mahua (*Madhuca latifolia*), hathchur (*Vaicum erticuletum*), bringaraj/ kalkeshut (*Eclipta alba*), ata (*Annona reticulate*), nona (*Annona squamosa*), kadam (*Anthosephalus indicus*), kush (*Desmostachya bipinnata*), groundnut (*Arachis hypogea*), ghritakumari (*Aloe vera*), thankuni/ manboni (*Centella asiatica*), pudina (*Mentha* sp.), suryashishir/ fox-leg (*Drosera*), lajjabati (*Mimosa pudica*), bhui-champa (*Memiltonia* sp), muchkundo-champa (*Pterospermum acerifolium*), kathali-champa (*Artabotrys hexapetala*), jackfruit/ kathal (*Atrocarpus heterophyllus*), mulberry/ tut (*Bombax ceiba*), (*Morus* spp.), ganda (*Tagetes erecta*), hinche (*Enhydra fluctunus*), swetindrani (*Citrullum colocyanthus*), shon (*Crotilaria juncea*), methi (*Trigonella foenum-graecum*), mitha pata (*Scoparia dulsis*), spinach (*Basella alba*), dhutura (*Datura filix-mas*), black dhutura (*Datura stremonium*), amla (*Embelica officinalis*), phalsa (*Grewia subnaequalis*), jaba (*Hibiscus* spp.), pat/ jute (*Corchorus capsularis* and *C. olitorius*), china jute (*Abutilon* spp.), dumur/ fig (*Ficus glomerata*), kankrol (*Cucumia sutiuua*), tal (*Borassus flabellifer*), jalpai (*Elaeocarpus serratus*), bhadali (*Paederia foetida*), jam (*Eugenia jamboline*), gamar (*Gimelina arborea*), kagaj phul (*Bougainvillea spectabilis*), dhobi phul (*Mussaenda frustiari*), kek

phul (*Crinum asiaticum*), dheki (*Dryopteris ternatia*), amaltas (*Cassia fistula*), sankhapushpi (*Convolvulus microphyllus*), jatamanasi (*Nardostachys jatamansi*), paraspipul (*Thespesia populnia*), keora (*Pandanus fascicularis*), karanja (*Pongamia pinnata*), halud/ turmeric (*Adinis cordifolia*), tok-pata (*Oxalis* spp.).

Appendix2: Some animals, birds & fishes outside living in and around agro-system of North Bengal:

Animals: Makarsha/ spider/ *Heteropoda* spp., bichha/ scorpion/ *Buthus meroccanus*, kecho/ earth warm/ *Pheretima posthuma*, jonk/ leech/ *Hirudinaria granulosa*, kenno/ millipede/ *Julas terrestris*, telapoka or arshola/cockroach/ *Periplaneta americana*, kuno beng or vek/ common toad/ *Bufo melanostictus*, kotkoti beng/skipper frog/ *Rana cyanophlyctis,* kola beng or sona beng / *Rana tigrina,* jhi jhi poka/ cricket frog/ *Limnonectes limnocharis*, dhere indur/bandicoot rat/ *Bandicota indica*, metho indur/ Indian field mouse/ *Mus booduga*, nengti indur/ house mouse/ *Mus musculus*, gosap /monitor/ *Varanus* spp., maitta shap/ olivaceous keelback snake / *Atretium schistosum,* daras/ common rat snake/ *Ptyas mucosus,*goru or gai/ cow/ *Bovis indica*, chagal/ goat/ *Capra species*, kukur/dog/ *Canis familiaris*, janglee kukur or dhole or ram kutta/ Asiatic wild dog/ *Cuon alpinus*, pati shial or shial/Asiatic jackal/ *Canis aureus*, khek shial/Bengal fox/ *Vulpes benghalensis*, beji/ common grey mongoose/ *Herpestes edwardsii*, biral/ cat/ *Felis domesticus*, ban-biral/ swamp cat or jungle cat/ *Felis chaus*,

fishing cat/ *Rionailurus viverrinus,* chita bagh/ Indian leopard/ *Panthera pardus*, East Asian porcupine/*Hystrix brachyura*, gandha gokul or khatash or bham or bagdash/civet/*Vivma zibetha*, bhodor/common otter/*Lutra lutra*, ud biral/ oriental small-clawed otter/*Aonyx cinerea*, bon suar/ Indian wild bear/*Sus serofa*, badur / flying-fox or common bat / *Pteropus giganteus*, daini badur/ Indian false vampire/ *Megaderma lyra*, khargosh/ Indian hare/*Lepus nigricollis*, hispid hare/ *Caprolagus hispidus*, Himalayan mouse hare/ *Ochotona royeli*, kathbirali/ squirrel/ *Ratufa bicolor*, squirrel/ *Callosciurus pygerythrus*, girgity/chameleon, rokto chosa/ common garden lizard/ *Calotes versicolor*, gaur/ *Bos gaurus*, gibbon/ *Bunipithecus hoolock*, swamp deer/ *Cervus duvaucelii*, Asian elephant/ *Elephas maximus*, macaque/ *Macaca* spp.

Birds: dar kank/ large-billed crow or raven/ *Corvus macrorhynchos*, pati kank/ house crow/ *Corvus splendens*, dhanesh/ hornbill (pied hornbill/ *Anthracoceros maladaricus*, rufous-necked hornbill/ *Aceros nepalensis*, great hornbill/*Buceros bicornis*, wreathed hornbill/*Rhyliceos undulatus*), tree pie/ *Dendrositta* spp. (grey tree pie /*D. Formosa* and hari chacha/ rufous tree-pie/ *D. vagabunda*), cheer pheasant/ *Catreus wallichii*, kaleej pheasant or black breasted kalij/ *Lophura leucomelana*, kat mayur/ peacock pheasant/ *Polyplectron bicalearats*, mayur/ Indian peafowl/ *Pavo cristesus*, peafowl/ *Pavo* spp., green peafowl/ *Pavo muticus*, kukkut/ red jungle fowl/ *Francolinus francotinus*, bon murgi/ tragopan/ *Tragopan* spp. (Blyth's tragopan/ *Tragopan blythii*), jol kukkut/ coot/ *Falica atra*, jol murgi/ water rail or water hen/ *Rallus aquaticus,* moorhen/ *Gallinula*

*chloropus*, purple moorhen/ *Prophypio porphyrio*, chochoka or choka/ shelduck/ *Tadorna* spp. (*T. ferrugina* and common *T. tadorna*), rajhans/ bar headed goose/ *Anser indicus*, buno rajhans/forest bean goose/ *Anser fabilis*, lesser white-fronted goose/ *Anser erythropus*, pati hans/ spot billed duck or grey duck/ *Anas poecilorhyncha*, khunte hans/northern shoveller/ *Anas clypeata*, chhai hans/ grey leg duck/ *Anas anser*, widgeon/ *Anas penelope*, gadwall/ *Anas strepera,* khopa hans/ tufted duck/ *Aythya fuligula*, kalo hans/ common pochard/ *Aythya ferina*, ranga jhuti hans/ red crested pochard/ *Rhodonessa rufina*, bhitu hans/ Bear's pochard/ *Aythya baeri*, sada chokh bhitu hans/ (white eyed) ferruginous duck/ *Aythya nyrocha*, vadi hans/ white-winged duck/*Cairina seululala*, holde sithi hans/ Eurasian wigeon/ *Anas penelope*, nil matha hans or nilsir/ mallard or blue head wild drake/ *Anas plantyrhynchos*, bacha hans/ comb duck/ *Sarkidiornis* sp., bali hans/ cotton teal or cotton pigmy-goose/ *Nettapus coromandelianus*, patari hans or peri hans/ common teal/ *Anas crecoa*, baikal teal/ *Anas formosa* , sikhajukto hans/ falcated teal/ *Anas falcate*, marbled teal/ *Marmaronetta angustirostris,* bara sarali/large whistling teal/*Dendrosygna bicolor*, chhoto sarali/lesser whistling teal/*Dendrosygna javanica,* goyar/darter/*Anhinga rufa*, pan kauri/shag/*Phalacrocorax fusciecllis,* dahuk/ white breasted waterhen /*Amaurornis phoenicurus*, chhai bok or anjan/grey heron/ *Ardea cinerea*, purple heron/ *Ardea purpuria*, kani bok/ Indian pond-heron or paddy bird/ *Ardeola grayii,* white-billed heron/ *Ardea insignis*, giant white-billed heron/ *Ardea imperialis*, Chinese pond heron/ *Adreala gra*yii, little green heron/ *Butorides striatus*,

Indian reef heron/ *Egretta gularis*, night herron/ *Nycticorax mucticorax,* go bok/ cattle egret/ *Bubulcus ibis,* bok /little egret/ *Egretta garzetta*, sada bok/great egret/ *Casmeroidus albus*, khute bok/spoon bill/*Platelia lencorodia*, saros/ ibis/ *Pseudibis* spp. (brown and black) and *Thresciornis melanocephala* (white), saros/ crane/ *Amaurornis* spp., shamuk bhanga/ Asian open billed stork/ *Anastomus oscitaus*, hargile/ stork/ *Ciconia* spp. (oriental stork/ *Ciconia boyciana*, white stork/ *C. ciconia*, white necked stork/ *C. episcopus*, black stork/ *C. nigra*), ram shalik/ black nacked stork/ *Xenorhynchus asiaticus*, sona jongha/ painted stork/ *Ibis leucocephalus*, shakun/vulture/*Gyps* spp. (white-rumped vulture: *Gyps bengalensis*), chil/black-winged kite/*Elanus caeruleus,* bhuban chil/ black kite/ *Milvus migrans,* gung chil/ tern/ *Stern* spp., shankachil/ brahminy kite/ *Haliastur indus,* tila baz or shapkheko baz/ crested serpent eagle/ *Spilornis eheela*, greater spotted eagle/ *Aquila clanga*, imperial eagle/ *Aquila heliaca*, fish eagle/ *Haliaeetus leucoryphus*, cuckoo (*Cacomantis* spp., *Cuculus* spp. : *Cuculus varius*- papia or chokh gelo, *C. microplerus*/ bou katha kao), kokil/ koel/ *Endynanuys scolopacea*, bon kokil/ large green billed malkoha/ *Rhopodytes tristis*, finge kokil/ drongo cuckoo/ *Surniculus lugubris*, finge/ drongo/ *Dicrurus* spp. (*D. adsimilis*/ black drongo, *D. aeneus*/ bronzed drongo, *D. paradiscus*/greater racket tailed dorongo, *D. aenena/* lesser racket tailed dorongo, *D. annectans/* crow billed type, *D. coernlescens* /white billed, *D. hottentottus*/ hair crested), ghugu/ dove/ *Streptopelia* spp. (*S. chinensis* /spotted dove/tila ghughu, *S. orientale*/ rufous turtle dove/ bon ghugu or ghugu, *S. tranquebarica*/ red turtle

dove/ lal ghugu or jongla ghugu and *S. decaota* /Indian ring dove or collared dove /raj ghughu), raj ghugu/ emerald dove/ *Chalcophaps indica*, bar tail cuckoo dove/ *Macrorygia unchall*, horikol/ pigeon/ *Tyeran* spp. (green *T. biceneta,* orange-breasted *T. curvirostra,* yellow-footed *T. phoeniciptera,* grey-fronted *T. pomdadora*), payra/ pigeon/ *Columba* spp. (blue rock pigeon/ *Columba livia*, purple wood or pale-capped pigeon/ *Columba punicea*, great imperial pigeon/ *Columba ducula aenae*, mountain imperial pigeon/ *Duluca badia*), shalik or bhat shalik/ common myna/ *Acridotheres tristis*, bon shalik/ jungle myna/ *Acridotheres fusces*, gung shalik/ bank myna/ *Acridotheres ginginianus*, mynah/ hill myna (grackle)/ *Gracula religiosa*, jhuti shalik/ short crested myna/*Acridotheres javanicus*, gue shalik/ pied myna/*Sturnus contra*, bhahmini myna/ brahmini mynah/ *Strunus pagodarum*, grey headed myna/ fat shalik/ *Strunus malabaricus*, charui/ house sparrow/*Passer domesticus*, Eurasian tree sparrow/ *Passer montanus,* khanjan/ white wagtail/ *Motacilla alba*, grey wagtail/ *M. caspica*, yellow headed wagtail/ *M. citreola*, yellow wagtail/ *M. flava*, khanjan/ Chinese olive-backed pipit/ *Anthus hodgsoni*, khanjan/ australasian pipit or paddy field pipit/ *Anthus novaeseelandiae*, nilkantha/ broad billed tay (*Eurystomus orientalis*), Indian roller (*Coracias benghalensis)*, magpie: green *Kittu chinensis* and green with red *K. crythrorhyncha*, flower pecker or honey bird/moutusi/ *Dicaeum* spp., kat thukra / woodpecker/ *Dinopium bengalense*, *Celebus brachyurus, Dendrocopos canicapillus, Blythipicus pyrrhotis, Chrysocolaptes lercidus, Dendrocopos atratui, D. canicapillus, D.*

*mabrattensis, D. macei, D. namus, Dinopium bengalense, D. javanensis, D. marnathensis, Gecinulus grautia, Hemicircus cancute, Hypopicus hyperithrus, Jynx torguilla, Micropternus breachyurus, Mulleripicus pulveulentus, Picumnus innominatus, Picus canus, P. chorolophus, P. harinucha, P. myrmecophoneus,* shui chura/ bee-eater / *Merops* spp., haldey pakhi/ block-hooded oriole or yellow bird/ *Oriolus xanthornus,* nil pakhi/ *Pitta* spp., hooded pitta or green breasted pitta/ *Pitta sordida*, chhoto machranga/ common kingfisher/ *Alcedo atthis*, machranga/ blyth's kingfisher/ *Alcedo hercules,* machranga/ white throated kingfisher / *Halcyan smyrnensis*, brown-winged kingfisher/ *Pelargopsis amauropterus*, stork-billed kingfisher/ *P. Capensis*, babui/ black-breasted baya weaver/ *Ploceus benghalensis*, bulbuli/ bulbul/ *Pycnonotus* spp. and *Hypsipetes* spp., pata bulbuli/ golden-fronted leaf bird/ *Chloropsis aurifrons*, tuntuni/ common tailorbird or wren warbler/ *Orthotomus sutorius*, golden headed wren warbler/ *O. cucullatus,* paddy field warbler/ *Accrocephalus agricola*, spotted bush warbler/ *Bradypterus thoracicus*, bristled grass-warbler/ *Chaetornis striatus*, large grass-warbler/ *Graminicola benghalensis*, booted warbler/*Hippalais caligata*, grasshopper warbler/ *Locustella* spp., striated marsh warbler/ *Megalurus palustris*, black- breasted warbler/ *Ploceus benghalensis*, leaf warbler/ *Phylloscopus* spp., long tailed warbler/ *Prinia* spp., thick billed warbler/ *Phragmaticola* spp., Adjutant/ *Leptoptilos* spp, slender-billed babbler/ *Turdoides longirostris*, marsh babbler/ *Pellorneum palustre*, rusty-throated wren babbler/ *Spelaeornis badeigularis*, tawny-breasted wren babbler/ *Spelaeornis*

*longicaudatus*, snowy-throated babbler/ *Stachyris oglei,* munia/black-headed munia/ *Lonchura malacca,* gagan ber/ spotted billed pelican/ *Pelecanus philippensis*, spine/ *Capella* spp. (kadakhocha/ great snipe/ *C. minima*, bon chaha/ solitary spine/ *C. solitaria)*, wood snipe/ *Gallinago nemoricola*, batan/ plover (ring plover and sand plover)/ *Charadrius* spp., balu batan/ sandpiper/ *Tringa* spp., spoon-billed sandpiper *Eurynorhynchus pygmeus*, titi/ lapwing/ *Vanellus* spp. (white tailed lapwing/ *V. leucurus*), bogudi/ stone curlew/ *Burhinus cedicnemus*, ababil/ house martin/*Delichon kashmiriense*, sand martin/ *Riparia* spp., chatak/striated swallow/ *Hirundo daurica,* tal chata/ larger striated swallow/ *Hirundo striolata,* palm swift/naknati/ *Cypsiurum parvus*, dark-rumped swift/*Apus acuticauda*, edible nest swift let/ *Collocalia innominata*, crested swift/ *Hemiprocne longipennis*, dhania pakhi or basanta bauri/ barbet/ *Megalaima* (*M. asiatica, M. baemacaphala, M.australis*), din kana/ night jar/ *Caprimulgus* spp., latoa/ shrike/ *Lanius* spp., tia/ parakeet/ *Psillacula* spp. and *Loriculus* spp., beua/ pheasant tailed jacana/ *Hydrophazianus chirurgus*, jolpipi/ bronze winged jacana/ *Metopidius indicus,*doel/ Indian robin/ *Saxicoloides fulicata,* pathure doel/ blue rock thrush/*Monticola solitarius*, laughing thrush/ *Garrulax* spp., flycatcher/ *Muscicapa* spp., futki/ grey headed flycatcher/ *Culicicafa* sp., fantail flycatcher/ *Rhipidura* spp., forktail/ *Enicurus* spp., bush chat/ *Saxicola* spp., blue chat/ *Enicurus* spp., hudhud/ hoope/ *Upupa epopa*, pencha/ spotted owlet/*Athene brama*, hutum pencha/brown fish owl/ *Bubo*

*zeylonensis*, rock eagle owl/ *Bubo benghalensis*, collared scops owl/ *Otus spilocephalus*, lakshmi pencha/ barn owl/ *Tyto alba*

Fish:magur/ magur/ *Clarius batrachus,* shingi/ shinghi/ *Heteropneustes fossilis,* koi/ climbing perch/ *Anabas testudineus*, bain/ eel/ *Macrognathus aculeatus*, shol/ striped snakehead/ *Channa striatus*, cheng/ Asiatic snakehead/*Channa orientalis*, taki/ spotted snakehead/ *Channa punctatus*, bele/ tank gobi/ *Glossogabius giuris*, gutum/ pool barb/ *Lepidocephalus guntea,* foli/ grey featherback/*Nolopterus notopterus*, chapila/ Indian river shad/ *Gudusia chapra*, punti/ guntea loach/ *Puntius sophore*, sarpunti/ olive barb/ *Puntius sarana*, tit punti/ *Puntius ticto*, catla/ catla/ *Catla catla*, rui/ rohu/ *Labeo rohita*, mrigel/ mrigel/ *Cirrhinus mrigela*, and so forth.