Economic plants of Champak Roy Chack village under Garhbari-II Garm Panchayat in Contai-Sub Division of Purba Medinipur District in West Bengal State, India

Debabrata Das[1]
[1] Department of Botany
[1] Ecology Laboratory, Lalgarh Govt. College, Lalgarh, Jhargram, West Bengal, India

Abstract- *The Paper reflects home garden of 10 villagers in Champak Roy Chack village in Garh Bari Gram Panchayat under Purba Medinipur District of West Bengal, India. It includes plants of local food items (26 species), vegetables (16 species), leafy vegetables (19 species), medicinal plants (21 species), aquatic plants (7 species), timber and fuels (28 species), fodder plants (45 species) including a few interesting ornamentals like African fire ball or African Blood Lily i.e. Scadoxux multiflorus (Martyn) Raf. and genetic variants of four O' Clock (Mirabilis jalapa L.). Maximum plants used traditionally to prepare homemade dishes and other purposes including building materials in daily life of people. Almost all villagers use common plants round the year for home gardens and for paddy fields because of the absence of other kind of lands. Day by day, home gardens are threatening due to los of habitats and huge rise of population including fragmentation of family. The land has been used and fragmented to make building permanently or temporarily nearby old buildings or huts and make the land convenient for fisheries in a agricultural land. The present information is a model study to record the biodiversity and also to record the land use pattern up to date to sustain the ecosystem more manageable rather than degradable in near future.*

I. INTRODUCTION

Our village is our resource point. Our dream makes complete to gain from nature and utilize resources which are found vivid surrounding us. So, to make the environment tight and multifunctional always need use of resource which are found in the value based ecosystem without any kind of detrimental effect. The so called traditional system, and practice of old aged person's even elders from time to time in a particular area is therefore essential. The theme of the study and research is therefore is a presentation of my father's knowledge who was an engineer (electrical) but knew the use of science to develop environment and make it tight without loss of food chain. Therefore, he brought some plants from virgin place and planted in his home garden like Champak Roy Chack village and studied well for regeneration. Use of bio fertilizer, organic manure, and green manure and so on in the village is now under verge of extinction but for local economy a village need these. Remembering these themes, his effort made it easy and convenient to use bullocks, cows, goats, hens, ducks, fishery (indigenous), coconut plantation, rice cultivation (indigenous method based), banana plantation, yam, corm and so on plantation in his own platform to earn money and become self supported. As a whole the land became fertile and filled with varied types of bio-resources including plants of agricultural varieties. A bio-resource based village is therefore come in to appearance and highlighted a biodiversity which may be a model for first time representation its own natural resource for ready societal development. As there are no data on the biodiversity resource of village so the survey based research was undertaken to record the bio-resource and presentation of these in a common platform to use in other areas for resource generations and mobilization of resource for economic development.

II. MATERIALS AND METHODS

Village survey was conducted from 2010 to 2017 to study the resource and mobilization of resource from village. Record books were used to locate resource points, habitats, plants, animals, microbes, non-living resources like compost, garbages, green manure, bio-fuel, fuel, fodder, vegetables, geern and leafy vegetables etc. Camera, tape, measuring tape, lux meter and pH meter was used time to time to know the bio-load of the village to know the carrying capacity on an ecological basis. Markets like Kajlagarh, Nazir Bazar, Kalaberia, Heria, Jukhia, Bajkul was taken to know the resource mobilization including biomass flow time to time. Seasonal study on plants and animals of the local area was also used.

III. RESULT AND DISCUSSION

Village Champak Roy Chack is truly a nice village though the village suffers transportation, drinking water facility and infrastructural facilities like gramin market (hats) so on, but it depicts a large variants of agricultural products in home gardens and nearby (ponds, rice fields etc.) that harbour a large number of plants which get benefit to the villagers. It conserves so many indigenous bird species, fishes in ponds; large number of reptiles, enumerable number of plants though a survey based presentation is presented here. In total the village boosts 26 plant species under 25 genera and 17 families (Table 1) used as ready food source. 16 plant species under 13 genera and 7 families (Table 2) were used as common vegetables. 19 plant species under 18 genera and 16 families (Table 3) were used as leafy vegetables. 21 plant species under 21 genera and 11 families (Table 4) were used to cure the ailments as medicinal plants. 7 plant species under 5 genera and 4 families (Table 5) were used as food during flood as aquatic plants. 28 plant species under 28 genera and 14 families (Table 6) were used for timber and fuel wood purposes. 45 plant species under 41 genera and 12 families (Table 7) were used as fodder purpose. The use value of plants of the said village is presented in figure 19. Some plants used as ornamental in the village premises for house hold deity. Others used as decorative one to beautify the landscape. These are varieties of African Fire Ball, Karabi, Kolke, Sandha moni (four o' clock), Bel, Jui, Tagar, Sandha malati, Seuli, Sonali, tagar and champa. Bamboos are common which is used to make building and fishing staff (Fig. 1) and some time to make or frame the raiser (Supporter) of plants in home garden. Date palm and Palmyra palm used to make 'tari' (Local beer) and to make molasses. The leaves are used to prepare hand fan and local umbrella (Pakhia). A detailed study may be made later on to record the knowledge based practice in near future for reference study.

Table 1.Plants used as reedy source of food items which are common but local

Local Name	**Scientific Name**	**Family**
Aam	**Mangifera indica L.**	Anacardiaceae
Adda	**Zingiber officinale Roscoe**	Zingiberaceae
Akh	**Saccharum officinarum L.**	Poaceae
Amada	**Zingiber amada Roxb.**	Zingiberaceae
Amra	**Spodias dulcis L.**	Anacardiaceae
Batabi lebu	**Citrus maxima (Burm.) Merr.**	Rutaceae
Bel	**Aegle marmelos (L.) Correa**	Rutaceae
Chalata	**Dillenia indica L.**	Dilleniaceae
Deuch	**Artocarpus lakoocha Roxb.**	Moraceae
Dumur	**Ficus racemosa L.**	Moraceae
Gab	**Diospyros malabarica (Desr.) Kostel.**	Ebenaceae
Jam	**Syzygium cumuni (L.) Skeels**	Myrtaceae
Kachu	**Colocasia esculenta (L.) Schott.**	Araceae
Kamranga	**Averrhoa carambola L.**	Oxalidaceae
Khamalu	**Dioscorea alata L.**	Dioscoreaceae
Khejur	**Phoenix sylvestris L.**	Arecaceae
Kotbel	**Feronia elephantum Correa**	Rutaceae
Kul	**Ziziphus jujuba Mill.**	Rhamnaceae
Ool	**Amorphophalus paeonifolius (Dennst.) Nicolson**	Araceae
Pepe/Pipa	**Carica papya L.**	Caricaceae
Piyaj	**Allium cepa L.**	Liliaceae
Piyara	**Psidium guajava L.**	Myrtaceae
Rasun	**Allium sativum L.**	Liliaceae
Sapeda	**Manilkara achras (Mill.) Fosberg**	Sapotaceae
Tal	**Borassus flabellifer L.**	Arecaceae
Tentul	**Tamarindus indica L.**	Caesalpiniaceae

Table 2. Plants used as vegetables in village premises

Local Name	**Scientific Name**	**Family**
Begun	**Solanum melongena L.**	Solanaceae
Chalkumra	**Bebincasa hispida (Thunb.) Cogn.**	Cucurbitaceae
Dheras	**Abelmoschus esculentum (L.) Moench**	Malvaceae
Dhundul	**Luffa aegyptiaca Mill.**	Cucurbitaceae
Garamer Kumro	**Cucurbita pepo L.**	Cucurbitaceae
Jhinje	**Luffa**	Cucurbitaceae

	acutangula (L.) Roxb.	
Kundri	**Coccinia grandis (L.) Voigt**	Cucurbitaceae
Lalsak	**Amaranthus tricolor L.**	Amaranthaceae
Lanka	**Capsicum frutescens L.**	Solanaceae
Lau	**Lagenarira siceraria (Monila) Standl.**	Cucurbitaceae
Pui	**Basella alba L.**	Basellaceae
Rangalu	**Ipomoea batatas (L.) Lam.**	Convolvulaceae
Sabuj -Sad Sak	**Amaranthus blitum L.**	Amaranthaceae
Sasa	**Cucumis sativus L.**	Cucurbitaceae
Siter Kumra	**Cucurbita maxima Duchsshe**	Cucurbitaceae
Ucche	**Momordic acharantia**	Cucurbitaceae

Table 3. Leafy vegetables and associated vegetables of villagers in and around home garden

Local Name	Scientific Name	Family
Betho sak	**Melilotus alba Desr.**	Fabaceae
Chikuni sak	**Polygonum plebeium R. Brown**	Polygonaceae
Ghoragime sak	**Alternanthera sessilis (L.) R. Br. ex DC.**	Amaranthaceae
Gime sak	**Glinus opposetifolius (L.) Aug. DC.**	Aizoiaceae
Hinche sak	**Enhydra fluctuans Lour.**	Asteraceae
Kala mocha	**Musa paradisiaca L.**	Musaceae
Kala thore	**Musa bulbisiana Colla**	Musaceae
Kalmi sak	**Ipomoea aquatic Forsk.**	Convolvulaceae
Kulekhara sak	**Asteracantha longifolia Nees**	Acanthaceae
Kundli sak	**Coccinia cordifolia (L.) Voigt**	Cucurbitaceae
Lau sak	**Lagenarira siceraria (Monila) Standl.**	Cucurbitaceae
Nona sak	**Portulaca quadrifida L.**	Portulacaceae
Palank sal	**Spinacia oleracea L**	Chenopodiaceae
Piring sak	**Trigonella foenum-graecum L.**	Apiaceae
Piyaj Koli	**Allium cepa L.**	Liliaceae
Sajne sak	**Moringa oleifera Lam**	Moringaceae
Susni sak	**Marsilea quadrifolia L.**	Marseliaceae
Tentul sak	**Tamarindus indic L.**	Caesalpiniaceae
Thankuni sak	**Centella asiatica (L.) Urban**	Apiaceae

Table 4. Medicinal plants used to remedy the common problems in village as ready source

Local Name	Scientific Name	Family
Ayapan	**Eupatorium ayapana Vent.**	Asteraceae
Banyalata	**Mikania micrantha Kunth.**	Asteraceae
Basak	**Adhatoda vasica Nees**	Acanthaceae
Chikuni sak	**Polygonum plebeium R. Br.**	Polygonaceae
Gadda phul	**Tagetes patula L.**	Asteraceae
Gandal Pata	**Paederia foetida L.**	Rubiaceae
Gime sak	**Glinus oppositifolius (L.) Aug. DC.**	Aizoaceae
Hinche sak	**Enhydra fluctuans Lour.**	Asteraceae
Jhinge lata	**Luffa acutangula L.**	Cucurbitaceae
Karela sak	**Momordica charantia L. (Indian variety)**	Cucurbitaceae
Kuksima pata	**Blumea lacera (Burm. f.) DC.**	Asteraceae
Kundri lata	**Coccinia grandis (L.) Voigt**	Cucurbitaceae
Musakani	**Hemigraphis hirta (Vahl) T. Anders.**	Acanthaceae
Nagdona pata	**Artemisia vulgaris L.**	Asteraceae
Nim Kuri	**Azadirachta indica A. Juss.**	Meliaceae
Rangalu pata	**Ipomoea batatas L.**	Convolvulaceae

Sajne pata	**Moringa oleifera**	Morngiaceae
Sasa gach	**Cucumis sativus L.**	Cucurbitaceae
Teto kundri/Telakucha	**Cephalendra indica Noudin**	Cucurbitaceae
Thankuni pata	**Centella asiatica (L.) Urban**	Apiaceae
Tulsi pata	**Ocimum sanctum L.**	Lamiaceae

Table 5. Aquatic plants used for different purposes in village

Local Name	Sc. Name	Family
Hinche	**Enhydra fluctuans Lour.**	Asteraceae
Kule khara	**Asteracantha longifolia (L.) Nees**	Acanthaceae
Lal saluki	**Nymphaea rubra Roxb. ex Salisb. Syn. =N. lotus L.**	Nymphaeaceae
Nil salauk	**Nymphaea nouchali Burm. f.**	Nymphaeaceae
Padma	**Nelumbo nucifera Gaertn.**	Nymphaeaceae
Panikola	**Ottelia alismoides (L.) Pers.**	Hydrocharitaceae
Sada saluk (Sapla)	**Nymphaea pubescens Willd. Syn.=N. alba L.**	Nymphaeaceae

Table 6. Plants get timber and fuel to the people including economy during emergency rise

Local Name	Scientific Name	Family
Aam	**Mangifera indica L.**	Anacardiaceae
Akashmoni	**Acacia auriculiformis A. Cunn. ex Benth.**	Mimosaceae
Arjun	**Terminalia arjuna (Roxb.) W & A**	Combretaceae
Bakul	**Mimusops elengi L.**	Sapptaceae
Barun	**Crataeva religiosa G. Forst.**	Capparaceae
Bel	**Aegle marmelos (L.) Correa**	Rutaceae
Eucalyptus	**Eucalyptus longifolia Link. & Otto**	Myrtaceae
Gamhar	**Gmelina arborea Roxb. ex Sm.**	Verbenaceae
Goldmohar	**Delonix regia (Bojer ex Hook.) Raf.**	Caesalpiniaceae
Habol	**Thespesia populnea (L.) Soland. ex Correa**	Malvaceae
Haldephul	**Peltophorum ferrugineum (Decne.) Benth.**	Caesalpiniaceae
Jam	**Eugenia cumini (L.) Druce**	Myrtaceae
Kanchan	**Bauhinia purpurea L.**	Caesalpiniaceae
Kanthal	**Artocarpus heterophyllus Lam**	Moraceae
Karanja	**Pongamia pinnata (L.) Pierre**	Fabaceae
Khiris	**Samanea asaman (Jacq.) Merr.**	Mimosaceae
Kichmichi	**Inga dulcis (Roxb.) Willd.**	Mimosaceae
Lal Simul	**Bombax ceiba L.**	Bombacaceae
Mehagony	**Swietenia macrophylla King**	Meliaceae
Nim	**Azadirachta indica A. Juss.**	Meliaceae
Sad simul	**Ceiba pentandra (L.) Gaertn.**	Bombacaceae
Sapeda	**Manilkara achras (Mill.) Fosberg**	Sapotaceae
Segun	**Tectona grandis L. f.**	Verbenaceae
Siris	**Albizia lebbeck (L.) Benth.**	Mimosaceae
Sissoo	**Dalbergia sissoo Roxb.**	Fabaceae
Sonalu	**Cassia fistula L.**	Caesalpiniaceae
Subabul	**Leucaena leucocephala(Lam.) de Wit.**	Mimosaceae
Tentul	**Tamarindus indica L.**	Caesalpiniaceae

Table 7. Plants used as source of fodder and food during drought and flood

Local Name	Scientific Name	Family
Allu	**Solanum tuberosum L.**	Solanaceae
Badhakopi	**Brassica oleracea L. var. Capitata L.**	Brassicaceae
Bambusa	**Bambusa balcooa Roxb.**	Poaceae
Bambusa	**Bambusa tulda Roxb.**	Poaceae

Beet	**Beta vulgaris L.**	Chenopodiaceae
Boital	**Cucurbita maxima Duch.**	Cucurbitaceae
Cephalendra	**Cephalendra indica (Wight & Arn.) Naudin**	Cucurbitaceae
Chalkumra	**Bebincasa hispida (Thunb.) Cogn.**	Cucurbitaceae
Chichinga	**Trichosanthes cucumerina var. Anguna (L.) Haines**	Cucurbitaceae
Chloris gyana	**Chloris gayana Kunth**	Poaceae
Chola	**Cicer arietinium L.**	Fabaceae
Cynodon	**Cynodon dactylon (L.) Pers.**	Poaceae
Cyperus ro	**Cyperus rotundus L.**	Cyperaceae
Echinochloa	**Echinochloa colona (L.) Link**	Poaceae
Eleusine	**Eleusine indica (L.) Gaertn.**	Poaceae
Eragrostis	**Eragrostis tenella (L.) P. Beauv.**	Poaceae
Fimbrystylis	**Fimbristylis miliacea (L.) Vahl**	Cyperaceae
Fulkopi	**Brassica oleracea var. botrytis L.**	Brassicaceae
Futik	**Cucumis melo L.**	Cucurbitaceae
Gajar	**Daucus carota L.**	Apiaceae
Halud	**Curcuma longa L.**	Zingiberaceae
Hejal	**Barringtonia acutangula Gaertn.**	Lecythidaceae
Kalmi	**Ipomoea aquatic Forssk.**	Convolvulaceae
Maskalai	**Phaseolus mungo (L.) Masam.**	Fabaceae
Kyllinga	**Kyllinga monocephala Rottb.**	Cyperaceae
Lachryma	**Coix lacryma-jobi L.**	Poaceae
Lau	**Lagenarira siceraria (Monila) Standl.**	Cucurbitaceae
Leersia	**Leersia hexandra Sw.**	Poaceae
Mator	**Pisum sativum L.**	Fabaceae
Melothria	**Melothria heterophylla (Lour.) Cogn.**	Cucurbitaceae
Mikania	**Mikania micrantha Kunth**	Asteraceae
Mokolli	**Alysicarpus vaginalis (L.) DC.**	Fabaceae
Mouri	**Foeniculum vulgare Mill.**	Apiaceae
Mula	**Raphanus sativa L.** (Raphanus raphanistrum var. sativus (L.) G. Beck)	Brassicaceae
Oplismenus	**Oplismenus burmanii (Retz.) P. Beauv.**	Poaceae
Oryza	**Oryza rufipogon Griff.**	Poaceae
Oryza	**Oryza sativa L.**	Poaceae
Paspalidum	**Paspalidum flavidum (Retz.) A. Camus**	Poaceae
Paspalum	**Paspalum scrobiculatum L.**	Poaceae
Peninsetum	**Alopecurus typhoides Burm. f.**	Poaceae
Roetboelia	**Rottboellia cochinchinensis (Lour.) Clayton**	Poaceae
Sasa	**Cucumis sativus L.**	Cucurbitaceae
Sona Mug/	**Phaseolus radiates L.**	Fabaceae
Tarmuz	**Citrulus vulgaris Schrad.**	Cucurbitaceae

Table 8. Species, genera and family used in various purposes in Village premises

TABLE NO.	Species	Genera	Family
Table 1	26	25	17
Table 2	16	13	7
Table 3	19	18	16
Table 4	21	21	11
Table 5	7	5	4
Table 6	28	28	14
Table 7	45	41	12

PHOTOGRAPHS

Figure 1. Bamboo stick used to prepare local fishing stuff

Figure 2. Peltophorum ferrugineum (Dence.) Benth. flowers (Naturalised)

Figure 3. Ool before plantation in home garden

Figure 4. Khamalu before plantation in home garden

Figure 5. Rouvolfia tetraphylla – a medicinal plant

Figure 6. Siren insect showing mimicry on Mahogany tree

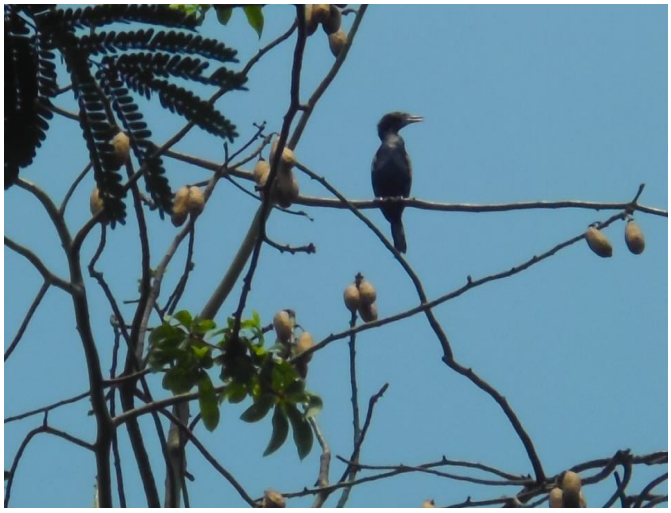

Figure 7. Little cormorant on Bombax pentandra (Sad Simul) tree

Figure 8. Jungle babbler on tamarind tree

Figure 9. Karanja Tree and fruits a source of veg. oil and Cake

Figure 10. Hazel seedlings and flowers (Pink red) a source of tannin

Figure 11. Gold mohar flowers of Deloniz rejia (Boj. ex Hook.) Raf.

Figure 12. Neem tree with floers and fruits

Figure 13. Banyalata (Antibleeding plant)

Figure 14. Pink and mixed white sandhamoni (Mirabilis jalapa L.)

Figure 15. Mixed coloured Mirabilis (Natural genetic variation)

Figure 16. Pink and white Mirabilis (Varied genetic makeup in same plant)

Figure 17. White Mirabilis in a plant (natural variant)

Figure 18. ire ball, Foot Ball Lily or African Blood lily i.e. Scadoxus multiflorus (Martyn) Raf.

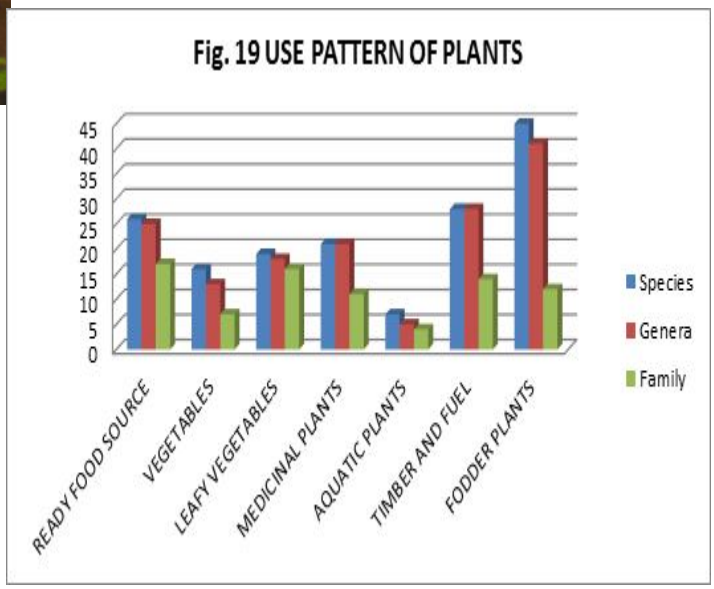

Figure 19. Plants of different types in Home gardens of Champak Roy Chack

IV. CONCLUSION

It is essential to recommend some comments towards conservation of Village Biodiversity. It is highly recommended that intrinsic value should be protected before the extrinsic value because each species has its own importance in a ecosystem nay, in an environment, that might be protected to protect of heritage and culture time to time as we protect our offspring in a sequential way even protect our intrinsic knowledge through transfer of knowledge from one to next generation. Similarly we should be kind hearted to each and individual i.e. from micro level to mega level to protect the natural environment though we are creating a new environment day by day. The inspiration and holistic approach should be transferred from base level to higher to protect the village based biodiversity to protect our resource and virtually to transfer the same to other villagers of nearby village. It would protect the local flora, fauna and even the ecosystem in a scientific way and become more knowledgeable in compare to the others in the modern day society. Economic balance and ecological sustenance would automatically will rise which would convey the ecosystem balance between resource and habitats for our sustenance.

IV. ACKNOWLEDGEMENTS

A acknowledge my gratitude to Late Kanailala Das, Bani Binod Das, who higly appreciated during my research. I thank to my grandmother Late Ganodamoyee Das and grandfather Late Dharani Dhar Das for use of traditional knowledge since 1992. Villagers who helped me better were highly acknowledged. I thank well to my daughter Atmaja Avirupa Das, specialist, bird of common type, helped me during study.

REFERENCES

[1] Anonymous. 1997. Flora of West Bengal, Vol.-I , BSI, Kolkata, Flora of India, Series-2.

[2] Anonymous. 2005. An Illustrated Atlas of Scheduled Castes, Anthropological Survey of India, Kolkata, 16, pp.1-36.

[3] [3] Anonymous. 2005. Medicinal Plant Resources of South West Bengal, Vol.-I, Research Wing, Directorate of Forests, Govt. of West Bengal.

[4] Anonymous. 2010. Medicinal Plant Resources of South West Bengal, Vol.-II, Research Wing, Directorate of Forests, Govt. of West Bengal.

[5] [5] Bandyopadhyay, K. B. 2009. Amader Rajya (Bengali Version), Kishore Gyan Vigyan Prakashani, Spectrum Offset, Kolkata-37, pp. 76

[6] Beddel, P. E. 1998. Seed Science and Technology, Indian Forestry Species, Allied Publishers Limited, New Delhi, pp.1-346.

[7] Bestelmeyer, B. T; Trujillo, D. A; Tugel, A. J and Havstad, K. M. 2006. A Multi-Scale classification of Vegetation dynamics in arid lands: What is the right scale for models, monitoring, and restoration?, Journal of Arid Environments, 65: 296-318.

[8] Das, D. 2014. Community study of plant species in coastal areas of Mohana and Old Digha of Purba Medinipur District with special reference to Eco-sustenance of life in near future, India J. Applied & Pure Bio., 29 (2): 255-266.

[9] Das, D and Ghosh, P. 2014. Ecological Studies of Ecosystem Health Indicators at Nayagram of Paschim Medinipur District in Lateritic forests of Southwest Bengal, India, IOSR Journal of Environmental Science, Toxicology and Food Technology, 8(6): 48-63

[10] Das, A. A and Das, D. 2016. Preliminary Studies on Common Birds of West Bengal with special Reference to Vegetation Spectrum, India , IOSR-JESTFT, 10(11): 12-21.

[11] Das, D and Das, M. 2014. Vegetation Ecology of Coastal belt of Khejuri area of Purba Medinipur District with special reference to Hijli Coast, West Bengal, India, IOSR-Jour of Pharmacy, 4(2): 2319-4219.

[12] Dash, M. C and Das, S. P. 2010. Fundamentals of Ecology, Third Edition, The McGrew-Hill Companies, Tata McGrew-Hill Education Private Limited, New Delhi., pp.1-562.

[13] Greipsson, S. 2011. Restoration Ecology, Jones & Bartlett Learning, USA,2011, pp-387.

[14] Groom, M J; Meffe, G K ; Carroll, C R and Contributors. 2006. Principles of Conservation Biology, Third Edition, Sinauer Associates, Inc. Publishers, USA, pp.-793.

[15] Haines, H. H. 1921-25. The Botany of Bihar and Orissa, Vol. I-IV, BSI, Calcutta.

[16] Hooker, J. D. 1892-1897. Flora of British India, Vol. 1-VII, BSI, Calcutta.

[17] Jorgensen, S E; Xu, Fu-Liu and Costanza, R. 2010. Hand Book of Ecological Indicators for Assessment of Ecosystem Health, Second Edition, CRC Press, New-York, pp.- 484.

[18] Popradit, A; Srisatit, T; Kiratiprayoon, S; Yoshimura, J; Ishida, A; Shiyomi, M; Murayama, T; Chantaranothai, P; Outtaranakorm, S; Phromma, I. 2015. Anthropogenic effects on a tropical forest according to the distance from human settlements, Scientific Reports, 5-14689: pp. 1-10 doi.: 10.1038/srep14689

[19] Prain, D. 1963. Bengal Plants, Vol.-I-II, (Revised Edn), BSI, Calcutta.

[20] Rao, R. R and Sharma, B. D. 1990. A Manual for Herbarium Collections, BSI, Brabourne Road, Kolkata-1.

[21] Das, D. 2017. Preliminary study of Angiospermic Flora of Lalgarh Government College Campus in West Bengal, IJSART, 3(4): 839-851

[22] Das, D and Das, A. A. 2017. New Destination to Kuldiha-an interesting Bird watching spot in West Bengal, India, IJSART, 3(2):12-17

[23] Das, D. 2017. Kansai Basin Flora at Lalgarh of Binpur-I Community Development Block in Jhargram Sub-Divison of Paschim Medinipur District in West Bengal, India, IJSART, 3(2): 1-11

[24] Das, D; Ghosh, P and Das, M. 2014. Phytodiversity of Kajlagarh Rajbati- A Cladar of wild medicinal plants in the territory of Heritage centre of Burdwan Raj System, East Midnapore, W.B., Env. & Ecol, 32(2): 471-473.

[25] Ghoah, P and Das, D. 2014. Ethnobotanical use of plants as living fence in and around Radhanagar village of Jhargram block, Paschim Medinipur District, West Bengal, IJAPB, 29(2): 223-229.

[26] www.westbengalforest.gov.in
www.nature.com/articles/srep 14689.

[27] Das, D. Ecological status of plants in sacred groves of southwest Bengal (Midnapore, Bankura and Purulia district) of West Bengal, Final UGC-Project Report, 2009, PSW-160/06-07(ERO) dated 19.02.2007.

[28] Das, D. 2015. Final Project Report on 'Ecological studies of Vegetation in coastal areas of Purba minipur under stress for sustenance of life', UGC-Project report (No. PSW-087/11-12 (ERO), Kolkata, dated 23.04.2013.