*IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT)*
*e-ISSN: 2319-2402,p- ISSN: 2319-2399.Volume 14, Issue 5Ser. II (May 2020), PP 01-13*
*www.iosrjournals.org*

# Riverine Plants of Kansai Basin at Purulia District West Bengal & how they Prevent Soil Erosion and Corrosion

Dipayan Dey*, Ushnish Bauri, Debasish Tikait
*PG Students, Department of Botany, Sidho Kanho Birsha University Purulia, West Bengal.*

***Abstract:-****Soil erosion is a critical environmental problem throughout the world's terrestrial ecosystem. Soil erosion causes multiple damages in ecosystem such as crops grazing field, forest as well as in natural ecosystem. Erosion also reduces the water holding capacity because of rapid water runoff and decrease soil organic matter and also reduces the diversity of plants, animals and microbes. Soil erosion can be controlled by many plant species which are naturally grown in river bank. These hardy easy to grow plants send out nets of roots that help to hold topsoil, which reduce soil erosion. Present study reflects that how many plant species and generas and families present in Kansai basin of Purulia district, and how they take important role to prevent corrosion of soil at river bank in Purulia. All the plant species were available during post monsoon to post summer with a short phonological character. These plants slow down water as it flows over the land and these allows much of the rain to soak into the ground. Plant roots hold the soil in position and prevent it from washed away. Those plants also maintain the balance of mineral exchange between soil and water. It showed typical ecological behavior that might be the key factor for other researchers. Soil erosion also can be prevented by cementing embankment of river bank but it can destroy the naturalism of soil water relationship and dynamics of vegetations. So we must take care and spread awareness about these plants which prevent soil erosion and runoff.*

***Keywords:****Terrestrial ecosystem, Soil erosion, River bank, Plants, Purulia*

---

Date of Submission: 04-05-2020 Date of Acceptance: 18-05-2020

---

## I. Introduction

Worldwide, agricultural production mainly occupies about 50% terrestrial environment. Soil degradation starts from agricultural production initiation, its impact on human food production & the environment becoming dangerous more than before. Soil degradation effect crop improvement. Soil erosion cause loss of soil water nutrients also pollute surface water; constitute the main cause of deforestation. Soil erosion reduces agricultural & environmental productivity. In every year about 80 million tons of soil eroded from World's terrestrial ecosystem. As result nutrients valuable soil biota are transported.

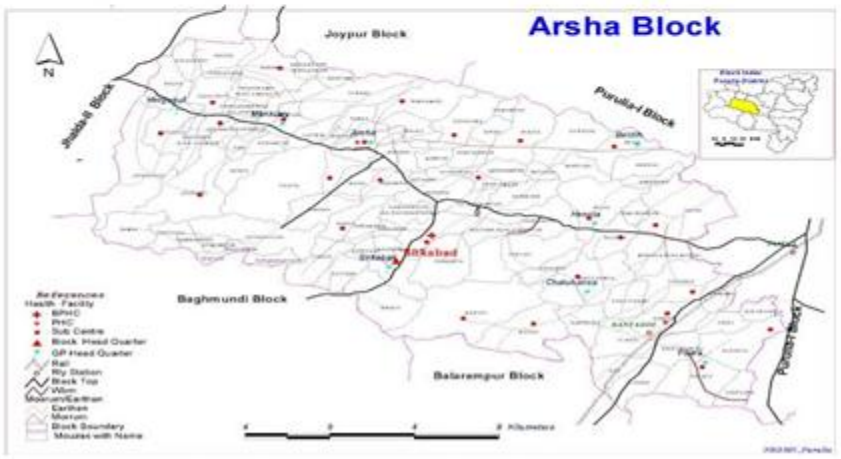
In district like Purulia(W.B.) soil erosion is also a wide range of problem near river banks. Here soil erosion cause reduce the water runoff & also reduce the water holding capacity because of rapid water runoff & also reduces the diversity of plants, animals & microbes. Soil erosion can be controlled by many herbs, shrubs, native grass plants which are take a major role in soil erosion control & have the added benefit to filtering easily into the landscape. They are easily transplant & take its conditions that mimic their natural habitat. These plants send out nets of roots that help to hold top soil, which reduce soil erosion. These plants also need less maintenance as they are adapted to the region in which they occur & receive most of their needs in the existing sites. In spite of soil erosion prevented plants of Kansai basin, there are many more vegetative plants observed by us. These also included in the plant name list.

***Study Area:-*** study area falls under various block's of Purulia district near the Kansai basin of Murguma,Deulghata, Bhalumara, Telidih, Dumrasol, Dabra, Mohadebbera, Gagda, these places are falls under Jhalda-II, Arsha community development block, Purulia-I & Manbazar-I block of Westbengal respectively.

These places are mainly part of Chotonagpur plateau of laterite soil. These soils has high erosive property, Serious loss of soil due to flow of river water during heavy monsoon & lower drainage system flow the heavy mass of soil in these areas. Extremely torpid bank & moist community have been taken as habitat for the study of plant. Only the winter season was taken to account & study field was Riverine plants of Kansai basin in Purulia and how they prevent soil erosion and corrosion.

## II. Materials & Methods

Study was driven in the riverbank of Kansai at Purulia district with a program scheduled for study of Riverine plants of Kansai & how they prevent soil erosion & soil runoff. The plants collected only for winter season when most of the varieties available as dry or almost dull. The season winter starts from 28th October to February with significant lower temperature i.e. 10-12˚C during January, 8-10˚C during November & December and 26-28˚C during October month. In February month temperature was variable between 15-26˚C. These variation of temperature during the study period categorized various moisture content in both the high riverbank & low riverbank also. Moisture content fluctuate between 12-16% in the bank soil. Regular visit have been made by us, students of Botany dept. of Sidho Kanho Birsha University, Purulia. Photographs were taken, plant specimens were collected, soil was carried out to know the moisture content study. Flora & monographs & literature & taken help from professors & research scholars of Sidho Kanho Birsha University to identify the plants. Couple of herbarium specimens were prepared for further study. Some unique plants were left there because they are endangered species according to I.U.C.N.



## III. Result &Discussion

Our present study shows a total 73 plant species under 73 genera and 43 families. Here, highest frequency of species were found in Asteraceae family. Some plant species were very important because they provide economical strength by yield as timber, fruit, flower and medicine. Many easy growing shrubs are common, which has crucial role to protect land through the growth is more or less slow. Many herbaceous vegetation found there with no significant characters, but maximum of them prevent soil erosion in river bank of Kansai.

**IMPORTANT&UNIQUEPLANTSWHICHPREVENTSOILEROSION&CORROSION**

| Sl no | Plant name | Family |
|---|---|---|
| 1 | ***Ipomoea pes-caprae* (L.) R.Br.** | **Convolvulaceae** |
| 2 | ***Ammannia baccifera* L.** | **Lythraceae** |
| 3 | ***Lagascea mollis* Cav.** | **Asteraceae** |
| 4 | ***Senna alata* (L.) Roxb.** | **Fabaceae** |
| 5 | ***Mesophaerum suaveolens* (L.) Kuntze** | **Lamiaceae** |
| 6 | ***Chromolaena odorata*(L.) R.M.King & H.Rob.** | **Asteraceae** |
| 7 | ***Calotropis gigantea* (L.) W.T.Aiton** | **Apocynaceae** |
| 8 | ***Martynia annua* L.** | **Martyniaceae** |
| 9 | ***Crotalaria pallida* Aiton** | **Fabaceae** |
| 10 | ***Chrysopogon aciculatus* (Retz.) Trin.** | **Poaceae** |
| 11 | ***Guilandina bonduc* L.** | **Fabaceae** |
| 12 | ***Jatropha gossypiifolia* L.** | **Euphorbiaceae** |
| 13 | ***Ficus benghalensis* L.** | **Moraceae** |
| 14 | ***Tamarix ericoides* Rottler & Willd.** | **Tamariaceae** |

| | | |
|---|---|---|
| 15 | ***Persicaria glabra* (Willd.)** | **Polygonaceae** |
| 16 | ***Lantana camara* L.** | **Verbenaceae** |
| 17 | ***Echinops echinatus* Roxb.** | **Asteraceae** |
| 18 | ***Vachellia nilotica* (L.) P.J.H.Hurter & Mabb.** | **Fabaceae** |
| 19 | ***Capparis zeylanica* L.** | **Capparaceae** |
| 20 | ***Vallaris solanacea* (Roth) Kuntze** | **Apocynaceae** |
| 21 | ***Ludwigia perennis* L.** | **Onagracea** |
| 22 | ***Saccharum spontaneum* L.** | **Poaceae** |
| 23 | ***Alangium salvifolium* (L.f.) Wangerin** | **Cornaceae** |
| 24 | ***Cocculus hirsutus* (L.) W.Theob.** | **Menispermaceae** |
| 25 | ***Tephrosia purpurea* (L.)Pers.** | **Fabacea** |
| 26 | ***Acacia nilotica* (L.) Willd. Ex Del. Ssp. Indica (Benth.) Brenan** | **Mimosaceae** |
| 27 | ***Achyranthes aspera* L.** | **Amaranthaceae** |
| 28 | ***Justicia adhatoda* L.** | **Acanthaceae** |
| 29 | ***Albizia lebbeck* (L.) Benth.** | **Mimosaceae** |
| 30 | ***Bambusa bamboos* (L.) Voss** | **Poaceae** |
| 31 | ***Cocos nucifera* L.** | **Arecaceaea** |
| 32 | ***Kyllinga triceps* Var.Cillata.** | **Cyperaceae** |
| 33 | ***Cuscuta reflexa* Var. Roxb.** | **Cuscutaceae** |
| 34 | ***Borassus flabellifer* L.** | **Arecaceae** |
| 35 | ***Ricinus communis* L.** | **Euphorbiaceae** |
| 36 | ***Cassia alata* L. (Roxb).** | **Caesalpiniaceae** |
| 37 | ***Vitex negundo* L.** | **Vitaceae** |
| 38 | ***Syzygium cumuni* (L.) Skeels** | **Myrtaceae** |
| 39 | ***Zizyphus oenoplea* (L.) Mill.** | **Rhamnaceae** |
| 40 | ***Amaranthus viridis* L.** | **Amaranthaceae** |
| 41 | ***Urena lobata* L.** | **Malvaceae** |
| 42 | ***Butea monosperma* (Lam.) Kuntze.** | **Fabaceae** |
| 43 | ***Ranunculus sceleratus* L.** | **Ranunculaceae** |
| 44 | ***Verbascum chinense* (L.) Santapau** | **Scrophulariaceae** |
| 45 | ***Cyanthillium cinereum* (L.) H.Rob** | **Asteraceae** |
| 46 | ***Lindernia rotundifolia* (L.)** | **Linderniaceae** |
| 47 | ***Mecardonia procumbens* (Mill.) Small** | **Plantaginaceae** |
| 48 | ***Centaurium pulchellum* (Sw.) Hayek ex Hand.-Nazz.,Janch. and Faltis** | **Gentianaceae** |
| 49 | ***Boerhavia diffusa* L.** | **Nyctaginaceae** |
| 50 | ***Rumex dentatus* L.** | **Polygonaceae** |
| 51 | ***Argemone mexicana* L.** | **Papaveraceae** |
| 52 | ***Centella asiatica* (L.) Urb.** | **Apiaceae** |
| 53 | ***Cyperus rotundus* L.** | **Cyperaceae** |
| 54 | ***Hygrophila auriculata* (Schumact.) Heine** | **Acanthaceae** |
| 55 | ***Scoparia dulcis* L.** | **Plantaginaceae** |
| 56 | ***Solanum sisymbriifolium* Lam.** | **Solanaceae** |
| 57 | ***Terminalia arjuna* (Roxb.ex DC.) Wight & Arn.** | **Combretaceae** |
| 58 | ***Andrographis echioides* (L.) Nees** | **Acanthaceae** |
| 59 | ***Phalaris minor* Retz.** | **Poaceae** |
| 60 | ***Indigofera linnaei* Ali** | **Fabaceae** |
| 61 | ***Justicia gendarussa* Burm.f.** | **Acanthaceae** |
| 62 | ***Ludwigia adscendens* (L.) H.Hara** | **Onagraceae** |
| 63 | ***Polygonum plebeium* R.Br.** | **Polygonaceae** |
| 64 | ***Pontederia vaginalis* Burm.f.** | **Pontederiaceae** |

| | | |
|---|---|---|
| 65 | ***Acmella paniculata* (Wall. Ex DC.) R.K.Jansen** | **Asteraceae** |
| 66 | ***Afrohybanthus enneaspermus* (L.) Flicker** | **Violaceae** |
| 67 | ***Wahlenbergia marginata* (Thunb.) A.DC.** | **Campanulaceae** |
| 68 | ***Matricaria discoidea* DC.** | **Asteraceae** |
| 69 | ***Cardamine pratensis* L.** | **Brassicaceae** |
| 70 | ***Cosmos sulphureus* Cav.** | **Asteraceae** |
| 71 | ***Eclipta prostrate* (L.) L.** | **Asteraceae** |
| 72 | ***Polypogonmon ospeliensis* (L.) Desf.** | **Poaceae** |
| 73 | ***Dalbergia sisso* Roxb. Ex DC.** | **Fabaceae** |

**PHOTOGRAPHS**

Fig-1:***Justicia adhatoda***

Fig-2:***Alangium salvifolium***

Fig-3: ***Cyanthillium cinereum***

Fig-4: ***Centella asiatica***

Fig-5: ***Cyperus rotundus***

Fig-6: ***Echinops echinatus***

Fig-7:***Ammannia baccifera***

Fig-8: ***Argemone mexicana***

Fig-9:***Centaurium pulchellum***

Fig-10: ***Boerhavia diffusa***

Fig-11: ***Capparis zeylanica***

Fig-12: ***Crotalaria pallida***

Fig-13: ***Guilendina bonduc***

Fig-14: ***Hygrophila auriculate***

Fig-15: ***Phalaris***

Fig-16: ***Ludwigia adscendens***

Fig-17:***Andrographis echioides***

Fig-18:***Cardamine pratensis***

Fig-19:***Pontederia vaginalis***

Fig-20: ***Wahlenbergia marginata***

Fig-21:***Ipomoea pes-caprae***

Fig-22:***Acmella paniculate***

Fig-23: ***Cosmos sulphurous***

Fig-24: ***Indigoferalinnaei***

Fig-25:***Eclipta prostrate***

Fig-26:***Matricaria discoidea***

Fig-27: ***Afrohybanphus enneaspermus***

Fig-28:***Lagascea mollis***

Fig-29: ***Lantana camara***

Fig-30:***Lindernia rotundifolia***

Fig-31:***Ludwigia perennis***

Fig-32:***Martynia annua***

Fig-33: ***Mecardoniao procumbens***

Fig-34:***Persicaria glabra***

Fig-35:***Rumex dentatus***

Fig-36:***Ranunculus sceleratus***

Fig-37: ***Saccharum spontaneum***

Fig-38:***Scoparia dulcis***

Fig-39: ***Senna alata***

Fig-40: ***Polypogon monospeliensis***

Fig-41: ***Vallaris solanacea***

Fig-42: ***Solanum sisymbriifolium***

Fig-43:***Polygonum plebeium***

Fig-44: ***Tamarix ericoides***

Fig-45: ***Verbascum chinense***

Fig-46:***Zizyphus oenoplea***

Fig-47: Beds of ***Vallaris solanacea*** preventing soil erosion

Fig-48:***Vachellia nilotica*** preventing soil erosion

Fig-49: Soil erosion in Telidih

Fig-50:***Bambusa***sp. Protecting soil erosion

Fig-51:Beds of ***Ipomoea pes-caprae*** holded the soil

Fig-52: Roots of ***Dalbergia sisso***

Fig-53, 54 & 55: **Net like plant root system holding the soil to prevent it from erosion & corrosion**

Fig-56: **Soil erosion prevented by plant roots**

Fig-57: Beds of ***Persicaria glabra***

Fig-58: ***Saccharum spontaneum*** preventing soil erosion

Fig-59: **Tall trees preventing soil erosion**

Fig-60 -Tall trees act as a barrier for the plastics which could fell into the water &can cause pollution

Fig-61: **Small grasses act as barrier to plastic & protecting the water bodies**

Fig-62: **Authors during survey at Kansai basin**

**Fig-63: Kansai basin at Purulia showing thin flow of water and soil erosion during January**

## IV. Conclusion

Floras of Kansai basin in Purulia district are very interesting because the life span of all plant species showed a varied phonological change with the change of climate. Our study is important because probably it is the first time report on the bank community of rivers in Purulia district (W.B.) which could be the starting point of taxonomic as well as economical research. The above mentioned plant species are main vegetation in Kansai basin of Purulia, some of them are unique plants, they also reduce the effect of erosive force using their root system and foliage.They also act as a barrier to protect the water bodies of river from plastic materials. Last but not least these plants minimize the destructive force of **"Horka Ban"** (flood) which is very common in Purulia district.

So we must take care and spread awareness to conserve these plants which prevent soil erosion and corrosion. Though *Ipomoea pes-caprae* is a poisonous plant for marine ecosystem but, this plant were established by Indian Government in various river bank of India to prevent soil erosion.

## Acknowledgement

We like to thank professors, research scholars, staff members of Botany department of Sidho Kanho Birsha University of Purulia; we also thankful to Mr. Sambhu Bhusan Sao, for their valuable suggestions to complete our study work.

## References

[1]. Anonymous. 2010. Medicinal Plant Resources of South Westbengal, Vol. II, Research.
[2]. Das, D. 2009. Ecological status of plants in sacred groves of South Westbengal (Midnapore, Bankura and Purulia district) of Westbengal, Final UGC-Project Report, 2009, PSW-160/06-07(ERO) dated 19.02.2007
[3]. Das, D. 2017 Kansai basin flora at Lalgarh of Westbengal. IJSART-Vol.3 issue 2-February.
[4]. Chakraborty, S K. Coastal Environment of Midnapore, Westbengal: Potential Threat and Management, Jour. Coast. Env,1(1), 2010, 27-40.
[5]. Pradhan, B &Rahaman H.C. New Addition of Flora of Birbhum District, Westbengal, Jour. New Biological Reports 3(3):234-239 (2014)
[6]. Anonymous Flora of Westbengal, Vol.-1,1997, Flora of India, Series-2,BSI,Kolkata.
[7]. Das, D. and Das, M. Vegetation Ecology of Costal belt of Khejuri area of Purba Medinipur District of Westbengal. Jour. Pharmacy Vol. 4, Issue 2 (February-2014), 56-77
[8]. Balasubhramanian, A. Soil Erosion Cause and Effect of Mysore. Jour. Center for Advance Studies in Earth Science. 2017
[9]. ASD 2002. Agriculture & Soil Division, IIRS P.G. Diploma Course pilot project report on Soil Erosion Inventory using IRS- WiFS data and GIS a case study of Dehra Dun district.
[10]. Lal, R. 1998. Soil Erosion impact on agronomic productivity and enviourment equality: Critical Review. Plant Science, 17 : 319-464
[11]. Lal, R. 2001. Soil degradation by erosion. Land degradation & development, 12:519-539
[12]. Singh, G., Babu, R., Narain, P., Bhushan, L.S. and Abrol, I.P. 1992. Soil erosion rates in India. J. Soil Water Conservation, 47:93-95.
[13]. Pande, L.M., Prasad, J., Saha, S.K. and Subramanyam, C. 1992. Review of Remote Sensing applications to soils and agriculture. Proc. Silver Jubilee Seminar, IIRS, Dehra Dun.
[14]. Basak R. K. and Guha Bakshi, D.N. Floristic studies on the state of Westbengal: Present status and future strategies. Bull. Bot. Surv. India. 1977, 19 (14): 42-48
[15]. Zuazo, D.H.V. &Pleguezuelo, R.R.C. Soil erosion and runoff prevention by plants. Agron. Sustain. Dev. 28 (2008) 65-86.
[16]. Haines, H.H. The Botany of Bihar and Odisha, Vol. I-IV, BSI, Calcutta, 1921-1995.