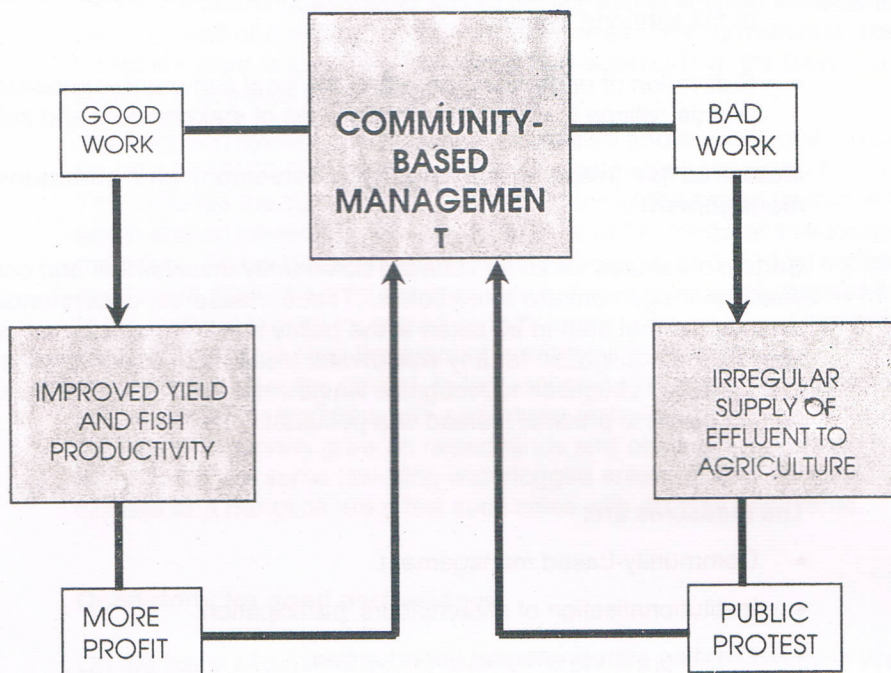


Thus, in the fishpond system for wastewater treatment, the management mechanism has undergone a complete change where non-performance is linked with community protest and good performance has an incentive in the form of increased profit.



Institutionalisation of stakeholders' participation

One of the few areas finding repeated emphasis in Agenda 21 is the need for institutionalisation of stakeholders' participation in implementing and managing community facilities. However, not many development projects include this vital provision as a desired objective to be achieved.

In the community-based option discussed here, the task of institutionalisation is achievable. For example, there can be a formal sharing of tasks with the local *panchayat* authorities in managing the fishpond system and distributing the nutrient-enriched effluent for irrigation.

The *panchayat* officials can also perform the task of identifying appropriate fish producers (individual, group or co-operative) to whom the implementing authority gives the licensing right to carry out pisciculture in the admissible water areas. The licensee in turn, pays a licence fee to the implementing authority.

Major stakeholders' groups will include:

- Implementing agency.
- Local self-governments (village *panchayats*).
- Beneficiaries and other interest groups.

The partnership which can be developed in implementing the wetland option will be of a networking nature rather than hierarchic. There can be involvement of all the three groups or between any two of them. For example the *panchayat* can levy water charges on the farmer families for reaching the nutrient-enriched effluent in the field channel. Similarly, the users can obtain technical information regarding water quality directly from the implementing agency without any role of the *panchayats* in between.

As with most of the components of the wetland option, the process of institutionalisation of stakeholders' participation is also dynamic in nature and with the passage of time, things are likely to improve considerably in the light of the experience gained and the lessons learnt.

Creating entrepreneurial opportunities

Conventional sewage treatment plants are not designed to promote resource mobilisation. The wetland option, on the contrary, provides immediate opportunity to attract local investment and entrepreneurial interest in fisheries and agro-forestry. Again, these new entrepreneurial efforts are likely to have multiplier effects on resource mobilisation as a whole. Enabling appropriate entrepreneurs is an important feature of the pond system option and holds the key to the sustainability of the project.

Basin-wide design for effluent disposal

Sanitation engineers have never thought of collecting basin-wide data in designing disposal of effluent from wastewater treatment plants. Their task has been to identify the nearest stream flow and link it with the plant outlet point through an outfall channel. This approach fails to attend to recycling needs and opportunities for effluent irrigation in agriculture. The best effluent irrigation planning should not aim at finding the shortest route for the effluent from the plant to the nearest receiving stream. On the contrary, it should find out the maximum possible area that can be irrigated by a regular source of nutrient-enriched water.

Depending upon the availability of wastewater, the provisional boundary of the command area using pond system effluent for irrigation purpose can be delineated. It will be wiser to have successively bigger command areas in phases according to the incremental nature of the availability of wastewater.

Participatory appraisal

The community-based projects are expected to have a positive impact on the existing resource base around the project area by providing nutrient-enriched water to grow more food and plants and create auxiliary facilities. A reliable appraisal of the initial status of the resource base and livelihood of the target

community will enable evaluation of the nature of changes that may subsequently take place.

For designating the initial status, reference situation studies should be carried out in the following aspects:

- Topography
- Species diversity
- Wastewater quality
- Existing farming practices
- Health and livelihood of the target community

Lessons in community involvement and community-based management

In the absence of any in-built provision for participatory approach the attempt was to draw upon every available opportunity to involve the local people. The results have been mixed. Success has been achieved in the following areas:

- a) Locating the best available site
- b) Gaining confidence of the village *panchayats*
- c) Establishment of formal sharing of responsibilities with the village *panchayat* to run the project

The failures have been:

- a) Inappropriate distribution of the fishpond system effluent for downstream irrigation
- b) Incomplete co-ordination with the block and district level planning and administrative authorities
- c) Incomplete awareness about the project among the local people leading to damaging comments by a section of them with a vested interest in the land acquired for the project

As distinguished from the new generation ecosystem conservation initiative, community-based projects still continue to be the old style sectoral development effort where engineers draw the project and local people only come to know about it. A basic change is needed in the planning concept to derive multiple social and economic benefits out of these community-based projects, where the local people are active participants in decision making.

In the peri-urban ecotones, where cities meet the countryside, the development process is complex and a successful transaction has to satisfy

a unique mix of both urban and rural needs and their mutuality of purpose. Developing fishpond ecosystem for wastewater treatment and resource recovery is an initiative that satisfies most of the environmental requirements simultaneously taking care of ecological sustainability and economic viability.

Creation and management of such symbiotic ecosystems are important to the decision makers in more than one way, as they encompass almost all the vital aspects of human development viz. improved urban sanitation, livelihood development, enhancing food security, resource mobilisation and fostering self-reliance. Completed projects in the Kolkata Metropolitan Area show that proper commitment and co-ordination can transform a low-lying area at the urban fringe. This is because a fishpond system project at the interface of a city and its countryside can improve the wastewater quality coming from the cities and recover nutrients for fisheries and agriculture (Ghosh, 1996).

General lessons in community involvement and community-based management of wastewater treatment and reuse will include the following:

- Low-lying areas at the urban fringe are potential locations for setting up pond system projects for municipal wastewater treatment and reuse. These projects are low cost, involve minimum construction, are energy efficient depending primarily upon solar energy and aim at self-reliance.
- Community-based fishpond system projects simultaneously provide a number of basic services for creating a stable urban fringe. In addition to municipal sanitation and reducing river pollution, these also ensure enhancement of food security, livelihood development of the poorer people and creation of environmental awareness.
- Community-based fishpond system projects for wastewater treatment and reuse are more reliable and have longer lifespan compared to the conventional mechanical treatment plants that are prone to damage and frequent breakdowns. Being basically a non-structural option, the items of repair and replacement involve very little cost or complications.
- Fishpond system projects are appropriately structured for rationalising the management. Here, poor performance invokes protests from downstream users whereas improvement in performance raises the productivity in the fishponds and the resultant profit.
- For ensuring greater involvement of the local people at the various stages of planning, implementation and project management, it will be wiser to look upon fishpond system projects as an area development effort having multiple attributes like irrigation, pollution control, environmental awareness and resource mobilisation.
- Community-based projects are flexible. They can work at a low level of wastewater loading (up to about 5 per cent of the design load) and convert such situations to the advantage of the project by increasing the water area available for pisciculture.

- In the mainstream design, it is not obligatory to ensure resource recovery. This acts as a deterrent for engineers and decision-makers to choose a fishpond system option. Selecting conventional designs makes their life simpler.
- Environmental engineers should be exposed to the participatory approach. This will enable them to use this tool during implementation and management of the projects. Lack of skilled workers and absence of an appropriate plan for participatory approach may create more problems than it aims to resolve.
- Local practitioners in wastewater reuse in poorer parts of the world are the repositories of knowledge and their traditional technology and can be suitably introduced in the national environmental programme as the best available option.

Way forward

In Agenda 21, a growth pattern has been envisaged that will be environmentally sound and will ensure inter-generational equity. This is considered to be absolutely essential to relieve the great poverty that is deepening in the developing world. But this hope for the future of humanity is conditional on decisive political action. It is necessary for the political action to begin managing environmental resources to ensure both sustainable human progress and survival. In the proposed wetland option, wastewater is treated as an environmental resource instead of the conventional technology approach of treating it as a pollutant. It clearly meets the engineering challenge of finding a growth model to ensure a sustainable future. From the capital intensive and non-viable options of the past, the time is ripe to switch over to a sustainable alternative where availability of funds need not be a constraint.

Municipal sanitation programmes in many cases are linked with multinational bank finance. It is therefore an obligation of the funding agencies to appreciate the United Nations mandate on searching for technology options to replace non-viable "junk-yard" packages. They invariably help the vested interests both at the global as well as at the local levels with little or no improvement in the quality of life of the common people in whose name such finance is sought and who ultimately bear the debt burden. Kolkata's resource recovery practice is a "tutorial ecosystem" for others and is a pointer towards the future grammar of river sanitation in the poorer countries.

Institutionalising community involvement and stakeholder participation is a recent concept in project planning, design and implementation of development projects. Although it is a preferred approach to reach the goal of sustainability, it has not been found to be easily achievable. It will need deeper understanding of the kinds of interest, which bind various individual groups and market forces for finding reliable guidelines to implement community-based approach. Immediate barriers to community-based approach may therefore be traced from the following facts:

- *Prevailing top-down approach neither has enough provision for consultation at the community level nor provides adequate scope for exchanging and infusion of community wisdom.*
- *Top-down approach assigns specialists as the key personnel, but community-based approach essentially needs facilitators. This is the kind of perceptual change that does not easily come to the classical mindset of the development promoters.*
- *Community-based approach draws the specialists much closer to the problem and makes them more answerable to the people and at times the experiences can be difficult. This is not the usual milieu that the specialists are accustomed to.*
- *Community-based approach is not as yet appropriately developed to restrict the degree of involvement within a programmatic domain. Theoretically the involvement can keep on extending with a definite risk of far too many views to drive at a consensus. This may lead to new conflicts and even political overtones that might result in feeding the entire effort to futility.*
- *Community involvement at the level of planning and design can, at times, open up completely different approaches to reach the objective of the projects. Existing frame of work may not always be so flexible as to negotiate such wide range of conceptual variations in project planning and design.*

CHAPTER 7

Living Creatively with Nature

Sustainable development of the rich countries and sustainable development of the poorer countries is not one and the same.

All the preceding chapters could have independently been developed into separate monographs. This temptation has been avoided here for a specific purpose. This book, for that matter, has been written to bring out the perceptual brilliance of a traditional fishing community, living on the edge of a metropolitan city. They have been able to establish a remarkably meaningful transaction with nature in using what the modern society terms as waste – more precisely, urban wastewater. Unfortunately, this knowledge system is threatened and will need special endeavour to avoid its extinction. This is why the traditional practice, for the purpose of conserving a heritage at risk, became an ethical priority.

When there exists a conventional world view, which is the world view of the knowledgeable, it is very strong. Any view to the contrary gets spontaneously challenged. Wastewater is a 'pollutant' in the working assumption for the engineers, planners and administrators. The entire process of decision-making has grown on the basis of this assumption. A feeble voice of the environmental lobby that waste is a 'resource' has not been effective enough to challenge the conventional paradigm. Unwittingly and unknowingly, the fishing community beyond the east of Kolkata did just that. Admittedly, the intellectual expressions remained far cruder but the discernible clarity of the fishing community about how to look at wastewater towers much above their knowledgeable fraternity. This is why the practice needed revisiting.

A considerable part of the present monograph provides an account of what happens in the East Calcutta Wetlands. Essentially it addresses the questions, which are likely to occur to the reader newly introduced to the system. Locational details include the advantage of getting copious sunshine for the most part of the year. Sunshine happens to be the prime mover of this ecosystem and no other source of energy is needed for its functioning. The text discusses the gradual transformation of a salt marsh because of the receding flow of the brackishwater it received through a creek opening to the Bay of Bengal. *This phenomenon drove the local fish producers to search for an alternative source of water for continuing their traditional culture of*

growing fish. In such a compelling situation, the flow of wastewater from the city of Kolkata came in handy and the earliest wastewater fishponds were set up. What began as a small experiment eventually became the largest ensemble of wastewater fishponds in the world. Today, the area under wastewater fishponds has reduced considerably and the future of this traditional practice is unpredictable.

'From the masses back to the masses' is an old Chinese saying. To address the question of replication of the East Calcutta practice elsewhere, it was necessary to understand the basic mechanism of ecosystem working, make a scientific assessment of it and then bring it into the mainstream through acceptable design and planning criteria for water treatment and reuse. The steps to achieve these have been discussed and an attempt has been made to come up with certain ideas to develop the possible roadmap.

It may not be out of place to discuss the historical necessity for going back to the traditional knowledge system, particularly with reference to a search for a practicable roadmap to sustainable development for the poorer countries. In the ancient times, science was pursued to gain wisdom, understand nature and natural orders. Essentially, to live in harmony with nature. The basic mindset of the scientists was ecological. Things changed since the arrival of Francis Bacon in the seventeenth century. The goal of science became to acquire knowledge to dominate and control nature. "Modern science is used to dominate people as well as nature. Its elevation and promotion as the only valid way of knowing the world dismisses the major part of creativity, institution and tacit and traditional knowledge, that comprise the principal perceptive, expressive and cognitive powers of most people; in short, it devalues the ideas, experience and accumulated wisdom of the majority of humankind. Indigenous system of health care, medicine, education and agriculture, as well as ways of understanding the world and the place of people in it, have all been subject to the relentless onslaught of the modern scientific world view" (Ekins, 1992).

Science and development went hand in hand until it faced the 'rebellion of nature', which was brought into focus during the late 60s of the last century, when blunders of development were systematically exposed by outstanding ecologists. Most well known of such reports is Rachel Carson's *Silent Spring*. In fact, in 1969, the then Secretary General of the United Nations Mr. U. Thant submitted a seminal report to the Security Council detailing the crisis in the environment. All these events added together caused a desperate soul searching among the caretakers of the planet. *To live in harmony with nature* emerged as one common goal out of the ferment of contemporary political history. On the contrary, most of our traditional and indigenous practices were based on the wise use of nature and natural resources by the local people and did always care for nature.

However, a closer look at the traditional and indigenous practices can lead a step further in describing the transactions with nature we now envisage.

Revisiting the East Calcutta Wetlands has been useful in defining and understanding the modified precept of '*living creatively with nature*' in place of 'living in harmony with nature'. This becomes a classical example of the Hegelian concept of 'the negation of negation', which is the *reproduction of the old on a higher plane* and where the present serves as a midwife to deliver the future from the womb of the past.

To expect that the traditional knowledge system will be useful and a sought after paradigm all over the world is naïve. What is desirable is that the traditional and indigenous practices, cultural traits and folk pharmacopoeia should be recognized as the most crucial knowledge base for sustainable development in the poorer countries.

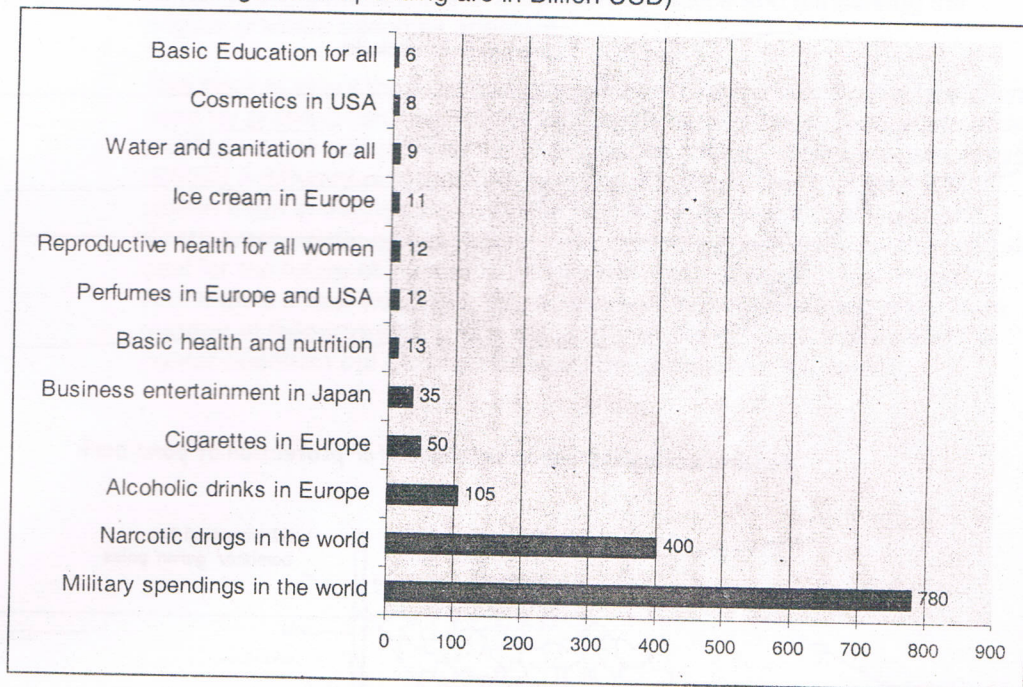
Sustainable development of the rich countries and that of the poorer countries is not one and the same. This however is contrary to the contents of the Brundtland Report of 1987, which in fact is considered as the base document of mainstream environmentalism. This has happened in spite of the fact that the report points out over-consumption by the rich people and countries as a cause of environmental destruction and yet provides a single all encompassing remedy of furthering the economic growth – 'growth that is forceful and at the same time economically stable'. No ambiguity of explanation has been permitted – we are told that in practical terms, this means 'more rapid economic growth in both industrial and developing countries, freer market access for the products of developing countries, lower interest rates, greater technology transfer and significantly larger capital flows, both concessional and commercial' (WCED, 1987).

Paul Ekins provides a succinct critique of this overarching remedy. He says that 'the problem with calling for more economic growth in this way is that nowhere in the Brundtland report is there a clear statement of how *sustainable economic growth* can be recognised and distinguished from the patently unsustainable variety which is all the industrial world has so far known and which was largely responsible, by the Commission's own analysis, for the environmental destructions which led to it being convened' (Ekins, 1992). When President George Bush walked away from the Kyoto Protocol because he was not prepared to compromise the standard of living of the Americans, he also took away with him the last trace of validity of one world concept having one common future and one single all-encompassing remedy of furthering the economic growth that is stable and forceful to lead to sustainable development.

Sustainable development is indeed the most profound expression of fealty to mainstream environmentalism. But this is hardly a new goal for the present economic order. Ever since the beginning of capitalist mode of production, development as a process has been sustainable and continuous.

Development priorities in general have hardly been affected by environmental concern. The Human Development Report (1998) brings out the basics of global development priorities shown in the following table: -

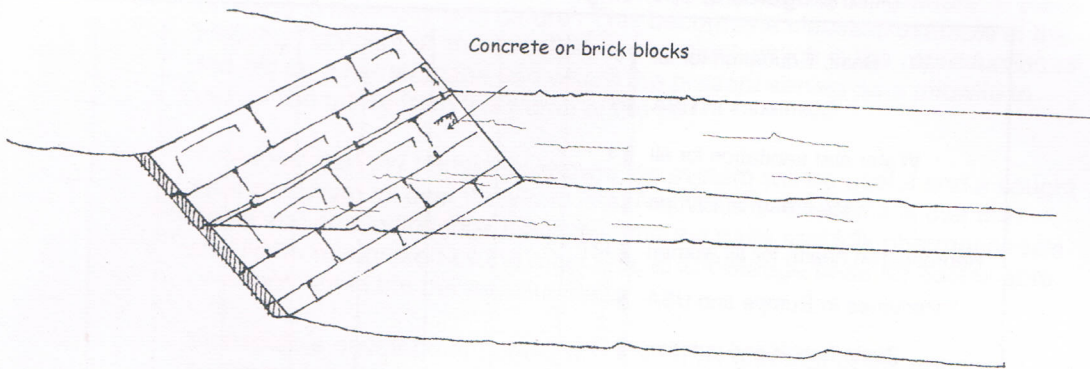
(All the figures of spending are in Billion USD)



It is difficult to expect significant changes in the above priorities in spite of Rio, Johannesburg and thereafter. The developing countries, therefore, will do best to search for their own options that will establish a friendly and creative relationship with nature. This is where the search for traditional knowledge system becomes important.

An example here may be helpful for comprehending the concept of living creatively with nature. In the East Calcutta Wetlands the fishponds are provided with an interesting system of bank protection facility. For civil engineers, the standard procedure to protect pond banks is the use of brick or concrete dykes. Local fish farmers do not have the capital to construct such dykes but have closer acquaintance with nature and capability to innovate. These people use about a three-meter wide water hyacinth lacing which breaks the surface waves and protect the banks (Fig.27). Again the same water hyacinth margin is used as an umbrella by the fish in summer months; while *Cyprinus carpio*, one of the popular varieties introduced in these ponds, enjoys eating the root material. It is enriching to see the creativity of the local fish producers and farmers in using the functions and characteristics of nature sustainably. Such examples of living creatively with nature are always found in most traditional and indigenous practices in our countryside. In fact, it is also possible to incorporate new scientific and technological lessons into the traditional practices for improving it further (such as using bacterial strains and accelerating biological degradation).

Civil engineers' recommendation for protection of pond bank



Natural ecologists' recommendation for protection of pond bank

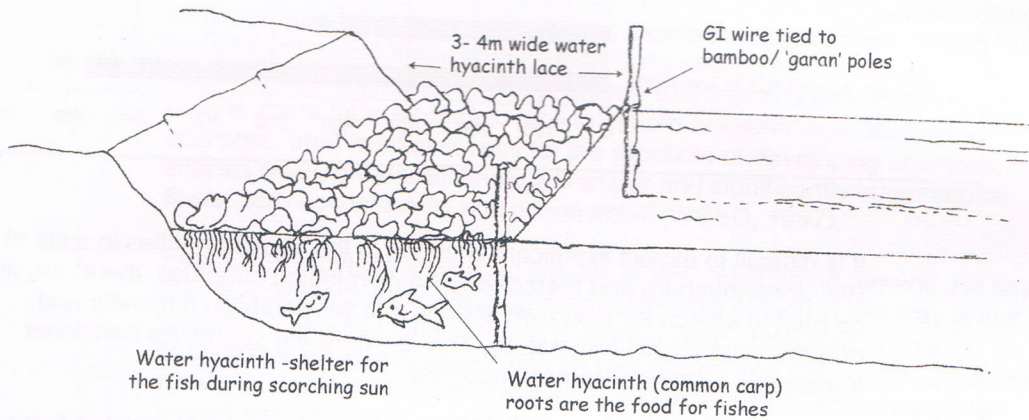


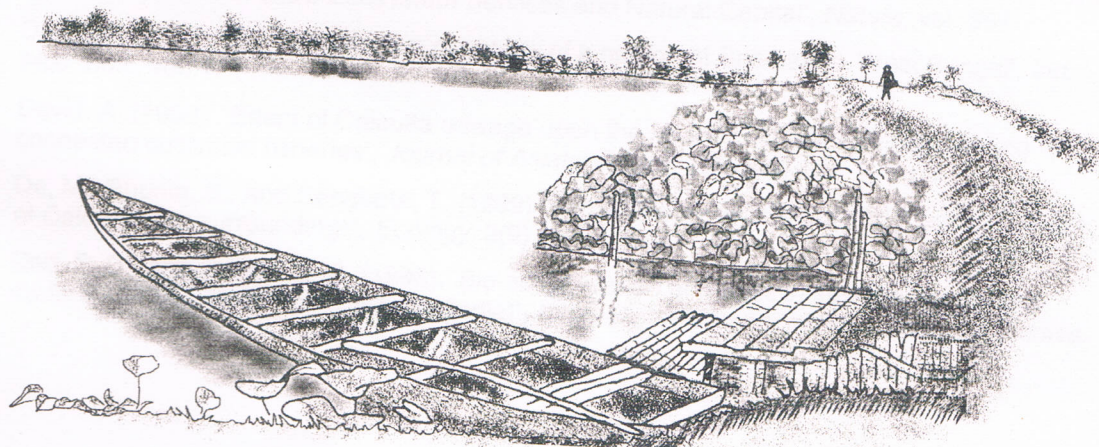
Fig.26: Water hyacinth lacing, an outstanding example of traditional ecological engineering from the East Calcutta Wetlands

Living creatively with nature, therefore, is a roadmap that draws heavily from the traditional knowledge system. The myriad repertoire of traditional and indigenous practices adds up to create this knowledge system that is distinctly separate from the mainstream stock of knowledge. Living creatively with nature will be an important environmental agenda, the search for which can best be incorporated at local level planning initiatives.

Going back to traditional practices does not mean a random adoption of whatever the indigenous people are doing. These can be further short listed by preliminary scientific enquiry ascertaining its validity. Thereafter, the most important task of ecological interpretation will have to be carried out with sufficient scientific vigour. Subsequent tasks will be one of mainstreaming the

lessons and simultaneously conserving the original practice in its place. If we get back to what has been done in the East Calcutta Wetlands, the basic steps for using the lessons of a traditional practice and conserving the original practice becomes apparent.

This book is about the East Calcutta Wetlands where wastewater has been used for growing fish, vegetables and paddy in successive resource recovery practices since about the turn of the previous century. In the process, it has defined a different purpose for such studies in traditional practices and placed them in the historical perspective of the evolution of science and development since ancient times. *Living creatively with nature* – the desirable goal for the future of science and development initiatives in the poorer countries is a new concept base, a new journey, where we require a large number of fellow travellers. It is not only a challenge for the people of the poorer countries but also for intelligent people all over the world.



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Annexure – 1

The Criteria for Identifying Wetlands of International Importance

Group A of the Criteria.

Sites containing representative, rare or unique wetland types

Criterion 1: A wetland should be considered internationally/nationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

Group B of the Criteria.

Sites of international importance for conserving biological diversity

Criteria based on species and ecological communities

Criterion 2: A wetland should be considered internationally/nationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Criterion 3: A wetland should be considered internationally/nationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

Criterion 4: A wetland should be considered internationally/nationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

Specific criteria based on water birds

Criterion 5: A wetland should be considered internationally/nationally important if it regularly supports 20,000 or more water birds.

Criterion 6: A wetland should be considered internationally/nationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of water bird.

Specific criteria based on fish

Criterion 7: A wetland should be considered internationally/nationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.

Criterion 8: A wetland should be considered internationally/ nationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

Specific criteria based on water/life & culture

Criterion 9: A wetland should be considered internationally/nationally important if it is an important source of food and water resource, increased possibilities for recreation and eco-tourism, improved scenic values, educational opportunities, conservation of cultural heritage (historic or religious sites)

Above criteria are based on the documents adopted of the Strategic framework for the Ramsar List in May 1999 and CoP 8 Meeting held in Valencia, Spain from 18-26 November 2002

Annexure – 2

Updated Inventory of Vascular Wetland Plants of the East Calcutta Wetlands

NAME OF THE PLANTS	DISTRIBUTION		PRESENT STATUS	ECONOMIC IMPORTANCE
	Core Area	Adjacent Area		
Flowering plant families				
ACANTHACEAE				
<i>Acanthus ilicifolius</i> Linnaeus (Harkuch kanta)	-	+	OCC	MED, APICULTURE
<i>Hygrophila difformis</i> (Linnaeus fil.) Blume (Jhangi)	-	+	COM(AW)	AQ, FDR
<i>Hygrophila polysperma</i> (Roxb.) T. Anderson (Khet papra)	-	+	COM(AW)	AQ, FDR
<i>Hygrophila schulli</i> (F. Hamilton) M.R. et S.M. Almedia (Kule Khara)	-	+	OCC	FD, MRD
ALISMATACEAE				
<i>Sagittaria sagittifolia</i> Linnaeus (Chotokut)	+	+	COM(AW)	FD, MED, WP
AMARANTHACEAE				
<i>Alternanthera philoxeroides</i> (Mart.) Griseb. (Ban-hingche)	+	+	COM	FD, MED
<i>Alternanthera sessilis</i> (L.) R. Brown ex A.P. De Condolle (Sanche/Chhanchi)	+	+	COM(AW)	FDR, MED, ED
APIACEAE				
<i>Centella asiatica</i> (Lin.) Urban (Thankuni)	+	+	COM	FD, MED
APONOGETONACEAE				
<i>Aponogeton natans</i> (Lin.) Engl. Et Krause (Ghechu)		+	RAR	AQ
<i>Aponogeton undulatus</i> Roxb. (Ghechu)	-	+	RAR	AQ
ARACEAE				

<i>Colocasia esculenta</i> (Lin.)Schott (Cachu)	+	+	COM	FD
<i>Cryptocoryne ciliata</i> (Roxb.) Schott (Kerali)	+	+		
<i>Pistia stratioides</i> Lin. (Topa pana)	+	+	COM(AW)	FDR, MAN, WP
ASTERACEAE				
<i>Eclipta alba</i> (L.) Hassk. (Kesut)	+		COM	MED
<i>Enhydra fluctuans</i> Lour . (Hingche)	+	+	OCC	FD, MED
CERATOPHYLLACEAE				
<i>Ceratophyllum demersum</i> Lin. (Jhanji)	-	+	COM(AW)	FDR, AQ
COMMELINACEAE				
<i>Commelina benghalensis</i> Lin. (Kanshira)	-	+	COM	FDR
<i>Commelina erecta</i> Lin.	-	+	OCC	FDR
<i>Murdannia nudiflora</i> (L.) Brenan	-	+	COM	FD, FDR
CONVOLVULACEAE				
<i>Ipomoea aquatica</i> Forsk. (Kalmi shak)	-	+	COM	FD, FDR, MED
<i>Ipomoea fistulosa</i> Mark. Ex Choisy (Dhol-kalmi)	+	+	COM	FL
CYPERACEAE				
<i>Bulbostylis densa</i> (Wailich) Handel Mazzeti	-	+	RAR	SB
<i>Cyperus cephalotes</i> Vahl.	-	+	OCC	FDR, TH, FL
<i>Cyperus compressus</i> Lin. (Chancha)	+	+	COM	FDR, TH, FL
<i>Cyperus corymbosus</i> Rottb. (Gola-methi)	+	+	OCC	FL, TH
<i>Cyperus difformis</i> Lin. (Behua)	+	+	COM	SB
<i>Cyperus exaltatus</i> Retz.	+	+	COM	TH, FL
<i>Cyperus haspan</i> Lin.	+	+	COM	FDR, FL
<i>Cyperus iria</i> Lin. (Bara chancha)	-	+	OCC	TH, FL

<i>Cyperus malaccensis</i> Lamk. (Chumati pati)	+	+	OCC	TH, FL
<i>Cyperus rotundus</i> Lin. (Mutha)	+	+	OCC	FL, SB
<i>Eleocharis dulcis</i> (Burm. F.) Trin.	-	+	COM	SB
<i>Fimbristylis dichotoma</i> (L.) Vahl.	+	+	COM	SB
<i>Fimbristylis squarrosa</i> Vahl.	+	+	COM	SB
<i>Fimbristylis tomentosa</i> Vahl.	+	+	COM	SB
<i>Scirpus articulatus</i> Linn. (Chirchira)	-	+	COM	FDR, FL
ERIOCAULACEAE				
<i>Eriocaulon trilobum</i> F. Hamilton Ex Kornicke	-	+	OCC	NS
FABACEAE(=PAPILIONACEAE)				
<i>Aeschynomene aspera</i> Lin. (Phul shola)	-	+	RAR	HAND, DECOR
<i>Aeschynomene indica</i> Lin. (Kath Shola)	-	+	OCC	FDR, FL
<i>Sesbania cannabina</i> (Retz.) Pers. (Dhurchi)	-	+	OCC	FDR, FL
HALORAGACEAE				
<i>Myriophyllum tuberculatum</i> Roxb. (Jhanji)	-	+	OCC(AW)	FDR, AQ
HYDROCHARITACEAE				
<i>Hydrilla verticillata</i> (Lf.) Royle (Jhanji)	-	+	COM, AW (FP)	FRD, AQ, MAN
<i>Nechamandra alternifolia</i> (Roxb. ex. Wight) Thwaites (Jhanji)	-	+	COM, AW (IC, RSD)	FDR, MAN
<i>Ottelia alismoides</i> (Lin.) Pers. (Pani Kalla)	-	+	COM	FDR, FD, AQ
<i>Vallisneria natans</i> (Lour) Hara (Pata sheola)	-	+	OCC(THER EAT)	MED, AQ, WP, MAN
LEMNACEAE				
<i>Lemna aequinoctialis</i> Welwitsch (Gunri pana/khudi pana)	+	+	COM (AW)	FDR, MAN, WP

<i>Spirodela polyrhiza</i> (L.) Schleiden (Matardal pana)	+	+	COM (AW)	FDR, MAN
<i>Spirodela punctata</i> (G.F.W.Meyer)Thompson (Matardal pana)	+	-	RAR	FDR, MAN, WP
<i>Wolffia gibbosa</i> (Roxburgh) den Hartog et van der Pals (Suji pana)	+	+	RAR	FDR,
LENTIBULARIACEAE				
<i>Utricularia aurea</i> Lour. (Pata Jhanji)	-	+	COM	FDR
<i>Utricularia gibba</i> Lin. (Pata Jhanji)	-	+	COM	FDR
<i>Utricularia stellaris</i> Lin.Fil. (Pata Jhanji)	+	+	COM	FDR
LYTHRACEAE				
<i>Ammania baccifera</i> Lin. (Dadmari)	-	+	OCC	NS
<i>Rotala densiflora</i> (Roth Ex Roemer ex Schultes) Koehne (Jhanji)	-	+	OCC	NC
MENYANTHACEAE				
<i>Nymphoides hydrophyllum</i> (Lour.) kuntze (Panseuli)	-	+	COM	WP,MED,BEAL
NAJADACEAE				
<i>Najas graminea</i> Raffeneau- Delile (Palak-jhanji)	-	+	RAR	FDR,AQ
NYMPHAEACEAE				
<i>Nymphaeae nouchali</i> N.L.Burman (Shaluk)	-	+	COM	FD,REL MED,BEAUT
<i>Nymphaeae pubescens</i> Willdenow (Shaluk)	-	+	COM	FD,REL MED,BEAUT
ONAGRACEAE				
<i>Ludwigia adscendens</i> (L.) Hara (Keshra/Keshardam)	+	+	COM	FDR,MED,REL

<i>Ludwigia perennis</i> Lin. (Banlanga)	-	+	COM	NS
POACEAE				
<i>Arundinella pumila</i> (Hochst.) Setud.	+	+	OCC	FDR
<i>Arundo donax</i> L.. (Gaba-nal)	+	+	COM	FDR
<i>Brachiaria distachya</i> (Lin.) Stapf. (Nari)	-	+	COM	FDR
<i>Brachiaria mutica</i> (Forssk.) Stapf.	-	+	COM	FDR
<i>Brachiaria reptans</i> (Lin.) Gard. & Hubb. (Chhota-jalganti)	-	+	OCC	FDR
<i>Coix aquatica</i> Roxb. (Gurgor)	-	+	OCC	FDR
<i>Coix lachryma-jobi</i> L. (Gurgor)	-	+	COM	FDR,REL MED
<i>Echinochloa colona</i> (Lin.) Link (Shyama ghas/Shyama dhan)	+	+	OCC	FDR
<i>Echinochloa crusgalli</i> (L.) Beauv. (Bara shana)	-	+	COM	FDR
<i>Eragrostis unioides</i> (Retz.) Nees ex. Steud. (Koni)	+	+	COM	FDR
<i>Eriochloa procera</i> (Retz.) C.E. Hubb.	+	+	COM	FDR
<i>Ischaemum rugosum</i> Salisb. (Morako)	-	+	OCC	FDR
<i>Leersia hexandra</i> Swartz	-	+	RAR	FDR
<i>Leptochloa panicea</i> (Retz.) Ohwi	-	+	COM	FDR
<i>Oryza sativa</i> Lin. (Dhan)	-	+	COM	FDR,FD,MED.FL
<i>Panicum paludosum</i> Roxb. (Kalasnar)	+	+	COM	FDR
<i>Panicum psilopodium</i> Trin.	+	+	COM	FDR
<i>Panicum repens</i> Lin. (Baranda)	+	+	COM	FDR
<i>Paspalidium punctatum</i> (N.L. Burm. A. Camus) (Patinar)	+	+	COM	FDR
<i>Phragmites vallisneria</i> (Lin.) Veldkamp (Nal)	+	+	RAR	WP, MU

<i>Saccharum spontaneum</i> Lin. (Kash/Khagra)	-	+	OCC	DECOR
POLYGONACEAE				
<i>Polygonum barbatum</i> L var. <i>gracile</i> (Denser) Steward. (Bekhunjubaz)	-	+	COM	FDR, MED
<i>Polygonum glabrum</i> Willdenow (Bihagni)	-	+	COM	MED
<i>Polygonum hydropiper</i> Lin. (Pakurmuli)	-	+	OCC	FDR, FL
<i>Rumex dentatus</i> Lin. (Ambavati)	+	+	COM	FDR, WP
PONTERIACEAE				
<i>Eichhornia crassipes</i> (Mart.) Solms. (Kachuri pana)	+	+	COM(AW)	FDR, WP, FD, MAN
<i>Monochoria hastata</i> (Lin.) Solms. (Nukha)	+	+	OCC	FDR, WP, MED
<i>Monochoria vaginalis</i> (Burm. F.) Presl. Ex Kunth. (Nukha)	-	+	RAR	FD, MED
POTAMOGETONACEAE				
<i>Potamogeton crispus</i> Lin.	-	+	OCC(AW)	FDR, AQ
<i>Potamogeton nodosus</i> Poir.	-	+	OCC	FDR, FD
SCROPHULARIACEAE				
<i>Bacopa monnieri</i> (Lin.) Wettstein (Brahmi shak)	-	+	COM	FD, MED
<i>Limnophila Indica</i> (L.) Druce. (Karpur)	-	+	OCC	AQ
<i>Limnophila heterophylla</i> (Roxb.) Benth. (Buro jhanji)	-	+	COM(AW)	AQ
TRAPACEAE				
<i>Trapa natans</i> Lin. var. <i>bispinosa</i> Roxb. Makino (Paniphal)	-	+	RAR	FD, WP
TYPHACEAE				
<i>Typha domingensis</i> pers. (Hogla)	-	-	COM(AW)	WP, TH, FDR, FD
VERBENACEAE				

<i>Lippia alba</i> (Mill.) Bar ex Britten & Wilson	+	+	OCC	FL
<i>Phyla nodiflora</i> (L.) Green (Bhui okra)	+	+	OCC	NS
FERNS AND FERN ALLIES				
AZOLLACEAE				
<i>Azolla pinnata</i> R. Br. ssp. <i>asiatica</i> Saund. et K. Fowler	+	+	COM	FDR, WP, MAN
MARSILEACEAE				
<i>Marsilea minuta</i> Lin. (Sushni)	+	+	COM	FDR, FD, MED
PARKERIACEAE				
<i>Acrostichum aureum</i> Lin.	-	+	RAR (THREAT)	FD
<i>Ceratopteris thalictroides</i> (Lin.) Brongn.	-	+	OCC	FD
SALVINIACEAE				
<i>Salvinia molesta</i> Mitchell.	+	+	COM	FDR, FD, MED

DISTRIBUTION: + denotes presence, - denotes absence

ECONOMIC IMPORTANCE :

FD - Food, FDR - Fodder (including fish feed), MED - Medicinal uses, WP - Water purification, SE - Aquarium Plant

BEAUT - Beautification of lakes and reservoirs, HAND - Handicraft, SR - Soil reclamation, MAN - Manure, PC - Pisciculture

REL - Listed in religious purposes, FL - Fuel, Th - Thatching, SB - Soil binder, DÉCOR - Decorative Purpose, NS - Not studies

PRESENT STATUS:

COM: Common, OCC: Occasional, THREAT: Threatened, RAR - Rare, END - Endangered, ENDM - Endemic

Source: CMW&SA (1997), Annexure 3.4/3

Annexure 3

THE CONSTITUTION (SEVENTY-THIRD AMENDMENT) ACT, 1992

[20th April, 1993.]

An Act further to amend the Constitution of India.

Be it enacted by Parliament in the Forty-third Year of the Republic of India as follows:-

1. Short title and commencement.- (1) This Act may be called the Constitution (Seventy-third Amendment) Act, 1992. (2) It shall come into force on such date as the Central Government may, by notification in the Official Gazette, appoint.
2. Insertion of new Part IX.- After Part VIII of the Constitution, the following Part shall be inserted, namely:-

PART IX THE PANCHAYATS

243. Definitions.- In this Part, unless the context otherwise requires,-

- (a) "district" means a district in a State;
- (b) "Gram Sabha" means a body consisting of persons registered in the electoral rolls relating to a village comprised within the area of Panchayat at the village level;
- (c) "Intermediate level" means a level between the village and district levels specified by the Governor of a State by public notification to be the intermediate level for the purposes of this Part;
- (d) "Panchayat" means an institution (by whatever name called) of self-government constituted under article 243B, for the rural areas; (e) "Panchayat area" means the territorial area of a Panchayat;
- (f) "population" means the population as ascertained at the last preceding census of which the relevant figures have been published;
- (g) "village" means a village specified by the Governor by public notification to be a village for the purposes of this Part and includes a group of villages so specified.

243A. Gram Sabha.- A Gram Sabha may exercise such powers and perform such functions at the village level as the Legislature of a State may, by law, provide.

243B. Constitution of Panchayats.- (1) There shall be constituted in every State, Panchayats at the village, intermediate and district levels in accordance with the provisions of this Part.

(2) Notwithstanding anything in clause (1), Panchayats at the intermediate level may not be constituted in a State having a population not exceeding twenty lakhs.

243C. Composition of Panchayats.- (1) Subject to the provisions of this Part, the Legislature of a State may, by law, make provisions with respect to the composition of Panchayats:

Provided that the ratio between the population of the territorial area of a Panchayat at any level and the number of seats in such Panchayat to be filled by election shall, so far as practicable, be the same throughout the State.

(2) All the seats in a Panchayat shall be filled by persons chosen by direct election from territorial constituencies in the Panchayat area and; for this purpose, each Panchayat area shall be divided into territorial constituencies in such manner that the ratio

between the population of each constituency and the number of seats allotted to it shall, so far as practicable, be the same throughout the Panchayat area.

- (3) The Legislature of a State may, by law, provide for the representation-
- (a) of the Chairpersons of the Panchayats at the village level, in the Panchayats at the intermediate level or, in the case of a State not having Panchayats at the intermediate level, in the Panchayats at the district level;
 - (b) of the Chairpersons of the Panchayats at the intermediate level, in the panchayats at the district level;
 - (c) of the members of the House of the People and the members of the Legislative Assembly of the State representing constituencies which comprise wholly or partly a Panchayat area at a level other than the village level, in such Panchayat;
 - (d) of the members of the Council of States and the members of the Legislative Council of the State, where they are registered as electors within-
 - (i) a Panchayat area at the intermediate level, in Panchayat at the intermediate level;
 - (ii) a Panchayat area at the district level, in Panchayat at the district level.

(4) The Chairperson of a Panchayat and other members of a Panchayat whether or not chosen by direct election from territorial constituencies in the Panchayat area shall have the right to vote in the meetings of the Panchayats.

(5) The Chairperson of -

- (a) a Panchayat at the village level shall be elected in such manner as the Legislature of a State may, by law, provide;
- (b) a Panchayat at the intermediate level or district level shall be elected by, and from amongst, the elected members thereof.

243D. Reservation of seats.-

(1) Seats shall be reserved for-(a) the Scheduled Castes; and (b) the Scheduled Tribes, in every Panchayat and the number of seats of reserved shall bear, as nearly as may be, the same proportion to the total number of seats to be filled by direct election in that Panchayat as the population of the Scheduled Castes in that Panchayat area or of the Scheduled Tribes in that Panchayat area bears to the total population of that area and such seats may be allotted by rotation to different constituencies in a Panchayat.

(2) Not less than one-third of the total number of seats reserved under clause (1) shall be reserved for women belonging to the Scheduled Castes or, as the case may be, the Scheduled Tribes.

(3) Not less than one-third (including the number of seats reserved for women belonging to the Scheduled Castes and the Scheduled Tribes) of the total number of seats to be filled by direct election in every Panchayat shall be reserved for women and such seats may be allotted by rotation to different constituencies in a Panchayat.

(4) The offices of the Chairpersons in the Panchayats at the village or any other level shall be reserved for the Scheduled Castes, the Scheduled Tribes and women in such manner as the Legislature of a State may, by law, provide:

Provided that the number of offices of Chairpersons reserved for the Scheduled Castes and the Scheduled Tribes in the Panchayats at each level in any State shall bear, as nearly as may be, the same proportion to the total number of such offices in the Panchayats at each level as the population of the Scheduled Castes in the State or of the Scheduled Tribes in the State bears to the total population of the State:

Provided further that not less than one-third of the total number of offices of Chairpersons in the Panchayats at each level shall be reserved for women:

Provided also that the number of offices reserved under this clause shall be allotted by rotation to different Panchayats at each level.

(5) The reservation of seats under clauses (1) and (2) and the reservation of offices of Chairpersons (other than the reservation for women) under clause (4) shall cease to have effect on the expiration of the period specified in article 334.

(6) Nothing in this Part shall prevent the Legislature of a State from making any provision for reservation of seats in any Panchayat or offices of Chairpersons in the Panchayats at any level in favour of backward class of citizens.

243E. Duration of Panchayats, etc.-

(1) Every Panchayat, unless sooner dissolved under any law for the time being in force, shall continue for five years from the date appointed for its first meeting and no longer.

(2) No amendment of any law for the time being in force shall have the effect of causing dissolution of a Panchayat at any level, which is functioning immediately before such amendment, till the expiration of its duration specified in clause (1).

(3) An election to constitute a Panchayat shall be completed- (a) before the expiry of its duration specified in clause (1); (b) before the expiration of a period of six months from the date of its dissolution:

Provided that where the remainder of the period for which the dissolved Panchayat would have continued is less than six months, it shall not be necessary to hold any election under this clause for constituting the Panchayat for such period.

(4) A Panchayat constituted upon the dissolution of a Panchayat before the expiration of its duration shall continue only for the remainder of the period for which the dissolved Panchayat would have continued under clause (1) had it not been so dissolved.

243F. Disqualifications for membership.-(1) A person shall be disqualified for being chosen as, and for being, a member of a Panchayat-

(a) if he is so disqualified by or under any law for the time being in force for the purposes of elections to the Legislature of the State concerned:

Provided that no person shall be disqualified on the ground that he is less than twenty-five years of age, if he has attained the age of twenty-one years;

(b) if he is so disqualified by or under any law made by the Legislature of the State.

(2) If any question arises as to whether a member of a Panchayat has become subject to any of the disqualifications mentioned in clause (1), the question shall be referred for the decision of such authority and in such manner as the Legislature of a State may, by law, provide.

243G. Powers, authority and responsibilities of Panchayats.- Subject to the provisions of this Constitution, the Legislature of a State may, by law, endow the Panchayats with such powers and authority as may be necessary to enable them to function as institutions of self-government and such law may contain provisions for the devolution of powers and responsibilities upon Panchayats at the appropriate level, subject to such conditions as may be specified therein, with respect to-

(a) the preparation of plans for economic development and social justice;

(b) the implementation of schemes for economic development and social justice as may be entrusted to them including those in relation to the matters listed in the Eleventh Schedule.

243H. Powers to impose taxes by, and Funds of, the Panchayats.-The Legislature of a State may, by law,-

(a) authorise a Panchayat to levy, collect and appropriate such taxes, duties, tolls and fees in accordance with such procedure and subject to such limits;

(b) assign to a Panchayat such taxes, duties, tolls and fees levied and collected by the State Government for such purposes and subject to such conditions and limits;

- (c) provide for making such grants-in-aid to the Panchayats from the Consolidated Fund of the State;
- (d) provide for Constitution of such Funds for crediting all moneys received, respectively, by or on behalf of the Panchayats and also for the withdrawal of such moneys therefrom, as may be specified in the law.

243I. Constitution of Finance Commission to review financial position.- (1) The Governor of a State shall, as soon as may be within one year from the commencement of the Constitution (Seventy-third Amendment) Act, 1992, and thereafter at the expiration of every fifth year, constitute a Finance Commission to review the financial position of the Panchayats and to make recommendations to the Governor as to-

- (a) the principles which should govern-
 - (i) the distribution between the State and the Panchayats of the net proceeds of the taxes, duties, tolls and fees leviable by the State, which may be divided between them under this Part and the allocation between the Panchayats at all levels of their respective shares of such proceeds;
 - (ii) the determination of the taxes, duties, tolls and fees which may be assigned to, or appropriated by, the Panchayat;
 - (iii) the grants-in-aid to the Panchayats from the Consolidated Fund of the State;
 - (b) the measures needed to improve the financial position of the Panchayats;
 - (c) any other matter referred to the Finance Commission by the Governor in the interests of sound finance of the Panchayats.
- (2) The Legislature of a State may, by law, provide for the composition of the commission, the qualifications which shall be requisite for appointment as members thereof and the manner in which they shall be selected.
- (3) The Commission shall determine their procedure and shall have such powers in the performance of their functions as the Legislature of the State may, by law, confer on them.
- (4) The Governor shall cause every recommendation made by the Commission under this article together with an explanatory memorandum as to the action taken thereon to be laid before the Legislature of the State.

243J. Audit of accounts of Panchayats.- The Legislature of a State may, by law, make provisions with respect to the maintenance of accounts by the Panchayats and the auditing of such accounts.

243K. Elections to the Panchayats.- (1) The superintendence, direction and control of the preparation of electoral rolls for, and the conduct of, all elections to the Panchayats shall be vested in a State Election Commission consisting of a State Election Commissioner to be appointed by the Governor.

- (2) Subject to the provisions of any law made by the Legislature of a State, the conditions of service and tenure of office of the State Election Commissioner shall be such as the Governor may by rule determine:
Provided that the State Election Commissioner shall not be removed from his office except in like manner and on the like grounds as a Judge of a High Court and the conditions of service of the State Election Commissioner shall not be varied to his disadvantage after his appointment.
- (3) The Governor of a State shall, when so requested by the State Election Commission, make available to the State Election Commission such staff as may be necessary for the discharge of the functions conferred on the State Election Commission by clause (1).
- (4) Subject to the provisions of this Constitution, the Legislature of a State may, by law, make provision with respect to all matters relating to, or in connection with, elections to the Panchayats.

243L. Application to Union territories.-The provisions of this Part shall apply to the Union territories and shall, in their application to a Union territory, have effect as if the references to the Governor of a State were references to the administrator of the Union territory appointed under article 239 and references to the Legislature or the Legislative Assembly of a State were references, in relation to a Union territory having a Legislative Assembly, to that Legislative Assembly:

Provided that the President may, by public notification, direct that the provisions of this Part shall apply to any Union territory or part thereof subject to such exceptions and modifications as he may specify in the notification.

243M. Part not to apply to certain areas.-(1) Nothing in this Part shall apply to the Scheduled Areas referred to in clause (1), and the tribal areas referred to in clause (2), of article 244.

(2) Nothing in this Part shall apply to-

(a) the States of Nagaland, Meghalaya and Mizoram;

(b) the Hill Areas in the State of Manipur for which District Councils exist under any law for the time being in force.

(3) Nothing in this Part-

(a) relating to Panchayats at the district level shall apply to the hill areas of the District of Darjeeling in the State of West Bengal for which Darjeeling Gorkha Hill Council exists under any law for the time being in force;

(b) shall be construed to affect the functions and powers of the Darjeeling Gorkha Hill Council constituted under such law.

(4) Notwithstanding anything in this Constitution,-

(a) the Legislature of a State referred to in sub-clause (a) of clause (2) may, by law, extend this Part to that State, except the areas, if any, referred to in clause (1), if the Legislative Assembly of that State passes a resolution to that effect by a majority of the total membership of that House and by a majority of not less than two-thirds of the members of that House present and voting;

(b) Parliament may, by law, extend the provisions of this Part to the Scheduled Areas and the tribal areas referred to in clause (1) subject to such exceptions and modifications as may be specified in such law, and no such law shall be deemed to be an amendment of this Constitution for the purposes of article 368.

243N. Continuance of existing laws and Panchayats. Notwithstanding anything in this Part, any provision of any law relating to Panchayats in force in a State immediately before the commencement of the Constitution (Seventy-third Amendment) Act, 1992, which is inconsistent with the provisions of this Part, shall continue to be in force until amended or repealed by a competent Legislature or other competent authority or until the expiration of one year from such commencement, whichever is earlier.

Provided that all the Panchayats existing immediately before such commencement shall continue till the expiration of their duration, unless sooner dissolved by a resolution passed to that effect by the Legislative Assembly of that State or, in the case of a State having a Legislative Council, by each House of the Legislature of that State.

243O. Bar to interference by courts in electoral matters. Notwithstanding anything in this Constitution -

(a) the validity of any law relating to the delimitation of constituencies or the allotment of seats to such constituencies, made or purporting to be made under article 243K, shall not be called in question in any court;

(b) no election to any Panchayat shall be called in question except by an election petition presented to such authority and in such manner as is provided for by or under any law made by the Legislature of a State.

Constitution, after sub-clause (b), the following sub-clause shall be inserted, namely:-
"(bb) the measures needed to augment the Consolidated Fund of a State to supplement the resources of the Panchayats in the State on the basis of the recommendations made by the Finance Commission of the State;"

Constitution, the following Schedule shall be added, namely:-

ELEVENTH SCHEDULE

(Article 243G)

1. Agriculture, including agricultural extension.
2. Land improvement, implementation of land reforms, land consolidation and soil conservation.
3. Minor irrigation, water management and watershed development.
4. Animal husbandry, dairying and poultry.
5. Fisheries.
6. Social forestry and farm forestry.
7. Minor forest produce.
8. Small scale industries, including food processing industries.
9. Khadi, village and cottage industries.
10. Rural housing.
11. Drinking water.
12. Fuel and fodder.
13. Roads, culverts, bridges, ferries, waterways and other means of communication.
14. Rural electrification, including distribution of electricity.
15. Non-conventional energy sources.
16. Poverty alleviation programme.
17. Education, including primary and secondary schools.
18. Technical training and vocational education.
19. Adult and non-formal education.
20. Libraries.
21. Cultural activities.
22. Markets and fairs.
23. Health and sanitation, including hospitals, primary health centres and dispensaries.
24. Family welfare.
25. Women and child development.
26. Social welfare, including welfare of the handicapped and mentally retarded.
27. Welfare of the weaker sections, and in particular, of the Scheduled Castes and the Scheduled Tribes.
28. Public distribution system.
29. Maintenance of community assets.

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ABOUT THE BOOK

'Give us poverty, sunshine and wastewater, we shall give you food, employment and purified water, free of cost' is what the ecosystem people of the East Calcutta Wetlands seem to say, and this book is all about that. It is in fact about an outstanding wetland ecosystem which gives us lessons in ecology and sustainable development the way it should be understood to meet the assault of greed-based development. Living creatively with nature is the new concept base, a desirable goal, the book has argued, for the future of science and development initiatives: a new journey, where we require a large number of fellow travellers. It is not only a challenge for the people of the poorer countries but also for the intelligent people all over the world.

ABOUT THE AUTHOR

The first Civil Engineer to obtain a doctoral degree in the field of Ecology from the University of Calcutta, Dr. Ghosh has been one of the earliest to become an Ashoka Fellow as a social entrepreneur. He is also amongst the few in the world to become a UN Global 500 Laureate for discovering and conserving a wetland which redefined Calcutta and for designing and implementing a wastewater management system out of poverty and sunshine. For more than thirty years, Dr. Ghosh remained a faithful public servant and has been steadfast to his professional commitment in bridging the gap between policy and practice. A member of the National Wetland Committee, Dr. Ghosh had been in the Board of Trustees of World Wide Fund for nature (WWF), India, for several years. He is an unrelenting thinker and spokesman for drawing up independent roadmaps for sustainable development on behalf of the poorer parts of the world. At present he is with the Centre for Studies in Social Sciences.

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