RESEARCHING REALITY INTERNSHIP| 2013

COMMUNITY OWNERSHIP OF YAMUNA

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CCS working Paper # 285

July 2013

Community Ownership of Yamuna

An effective solution to its problems

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CCS Working Paper No. 285

Summer Research Internship Programme 2013

Centre for Civil Society

Abstract

The transformation of Yamuna water from a gushing, crystal clear river at its source to a mere sewage drain four hundred kilometers downstream is a peculiar human making. The failure of government initiatives to clean the river has its base in the concept of a post-mortem approach, where it decides to get involved after the damage has already been done. A centralized and distant decision-making model that is indifferent or poorly responsive to the ecological, socio-economic and cultural circumstances of different regions, has led to increased inability to deal with the problems of the river.

Communities are well aware of the problems and solutions but are unable to take action due to the stringent state control. Over the past fifty years, the communities living around Yamuna have seen their livelihoods get destroyed, their homes dismantled and the river becoming excruciatingly polluted. This paper takes a step further, from not just suggesting community participation, but Community Ownership of Yamuna as a means to tackle its problems.

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Introduction

Over the past fifty years, the communities living around Yamuna have seen a threefold change—they have seen their homes dismantled, their livelihoods destroyed and Yamuna turning into a gutter.

Ten thousand feet above sea level is the Yamunotri glacier, where the river finds its origin. The water at that point is said to be so clear, that one can see the stones below and use it directly for cooking. Just 400 kilometers downstream, Yamuna becomes nothing more than a drain (Mahapatra 2012). What happens to Yamuna in a span of 400 KMs?

The most obvious answer is the high level of human use/disuse that squanders the river of all its beauty. However, by saying this we are assuming that there is something intrinsically wrong with all of us; that as our colonies progress, the natural ecosystems around us perish.

This paper argues that Yamuna's problems such as pollution and degradation are due to the centrist policies which govern it.

1. The paper points out the failure of government initiatives to clean the river, and its basis in the antiquated water laws governing it.
2. By evaluating the success of community ownership and community management in Ghana, Orissa and Kerala, the paper presents a strong case for a similar structure to be applied for Yamuna.
3. Finally we look at how those models can be replicated for Yamuna and how 'community management' can help make this river as clean as before.

This paper presents a strong case for 'community management' not only as a sustainable solution for Yamuna, but also to promote the economic independence for the people living around it.

Methodology

This paper argues that Yamuna's problems such as pollution and degradation are due to the centrist policies which govern it.

1. This paper assesses the failure of government initiatives to clean the river and the causes behind its failure.
2. It evaluates the history of water laws in India to farther understand the evolution of present water laws and their repercussions. By studying the relationship between change in water laws with the state of natural water resources in India, this paper argues for a more decentralized policy for water resource management.
3. It assesses the initiatives taken in Ghana, Orissa and Kerela to encourage community management and community ownership and takes their examples to create a similar model for Yamuna
4. Finally, the paper presents a working model for community ownership for Yamuna river and delves into understanding the various incentives for the communities to sustainably manage the river, while deriving profit from it.

The method involved deeply understanding the concepts of community ownership, riparian laws, and tradable water rights and their implications for Yamuna, and studying the various models adopted by a number of states.

Field visits along the Yamuna bank farther helped me understand the loss of the communities over time, their needs and their incentives to manage the river.

Yamuna

It is said that the feet of baby Krishna were washed in Yamuna as he was being carried by Vasudeva across the river from the Mathura side to the Gokul side. How dirty were Krishna's feet to have brought Yamuna to its current state of being?

The river Yamuna flows through the northern Indian state of Uttarakhand (where it originates at Yamunotri) and briefly forms an intestate border of Uttarakhand with Himachal Pradesh, before flowing into the plains of Uttar Pradesh, Haryana, Delhi and again into Uttar Pradesh and Haryana before finally merging with the mighty river Ganga at Allahabad (UP)(Dutta 2009, vii). The table below shows the area covered by Yamuna in various states. The total catchment basin of the Yamuna River is 3,66,223 sq.km

Table 1: State-wise Total Catchment area of Yamuna

Name of state	**Total Catchment Area (in Sq. Km)**	**Percentage contribution**
UP (including Uttaranchal)	74208	21.5
Himachal	5799	1.6
Haryana	21265	6.5
Rajasthan	102883	29.8
Madhya Pradesh	14028	40.6
Delhi	1485	0.4

(Central Water Commission 2007)

For centuries Yamuna has catered to a diverse array of needs such as—domestic water supply, irrigation, fish farming, industrial usage, waste disposal etc. The pollution of Yamuna however a more recent event that is not more than half a century old. Over the last few decades, the water of

Yamuna has deteriorated to a level that has gathered international attention. Despite huge expenditure and efforts put by the government to clean the river the quality of the water has only degraded (Christopher et al. 2012, 268).

The Sources of Pollution

The various point and non-point sources of Yamuna pollution are listed in the table below

Table 2: Point and non-Point sources of Yamuna Pollution

Point sources of Yamuna's Pollution	
1. Domestic pollution	Improper disposal of sewage waste, Lack in the number and efficiency of Sewage Treatment Plants
2. Industrial waste	Illegal dumping of untreated industrial waste
Non-point sources of Yamuna's Pollution	
1. Agricultural source	Pesticides, insecticides etc that are washed into the river
2. Dumping of dead bodies	People unable to afford a cremation directly dump dead bodies into the river
3. Immersion of Idols	At time of certain festivals like Ganesh Chaturthi
4. In-stream uses	Cattle bathing, washing clothes etc…

Yamuna Action Plan and its Failure

In 1993, the Union government launched the Yamuna Action Plan (YAP), to tackle the river's pollution. We are currently in the midst of its third phase.

In the last twenty years, around Rs 1,306 Crore have been allocated towards the YAP to clean the Yamuna (Shrivastava 2012). For instance, under YAP-I's extended phase, Rs 150 Crores was channeled into Delhi, to set up 1146 toilet complexes in 1100 slum clusters and 46 resettlement colonies to tackle the problem of sewage disposal. An analysis by the National River Conservation Directorate shows 60% of these complexes remain unused; they have no water, or are too expensive for people to use, or simply improperly sited or ill maintained (IL&FS 2006).

The CPCB had claimed in its report "Status of Water Quality in India-2010", that the polluted length of the river is about 500 km. Despite all the expenditure however, the results from recent monitoring have indicated that this distance where the river has been found to contain polluted water is 100 KMs more than the previous estimate of 500 KMs. (rtifoundationofindia, 2012).

The BOD (Biochemical Oxygen Demand) load in the river has also seen a rising trend (Central Department of Pollution Delhi Report).

Yamuna today is called a dead river, because there is no trace of life supporting oxygen. The biochemical oxygen demand of the river has only seen an increasing trend. The pollution of the river is affecting our everyday lives in a number of ways. It was found that the presence of heavy metals in the vegetables that are grown with Yamuna water, make them hazardous to health (TERI, 2012).Yamuna now releases ammonia gas into the air that causes difficulty in breathing and a permanent damage to lungs. It also releases hydrogen sulphide gas (h2s), which causes bronchitis, asthma and headache. Excessive pollution of Yamuna has resulted into obliteration of all life forms except toxic bacteria (Khandekar 2012).The arsenic levels which has increased 20 times in the last 20 years in the river is directly responsible for causing cancer and skin problems.

This provides conclusive proof that the steps taken by various government initiatives have been to no avail. The condition of Yamuna in fact, has only deteriorated.

History of Water Management in India

Due to the transitory nature of water, the rules governing its use have evolved in different ways than those governing other resources (Shah and Mehta 2007, 255).

Vedic Period

The *Arthashastra*, written by *Chanakya* (c. 350–283 BC) identifies human actions to be governed by *dharma* (law and order). The *Arthashastra* allowed for private ownership and said that all those who leased, hired, or shared such a body had the responsibility to maintain them. Private owners were allowed to give waters to other parties through irrigation works in exchange for produce. (Kautilya *c*.300 BCE: 231–232).

The *Arthashashtra* stated that in irrigating one's own field, no harm is to be caused to others. It prohibited the release of water from dams without a legitimate reason, the obstruction of the legitimate use of water by others, the obstruction or diversion of the watercourse, and the building of water works on the land belonging to someone else.

Where damage was caused to another party as a result of overflowing waters, compensation was owed to the other party. Compensation also included the death penalty (death by drowning) (Kautilya *c*.300 BCE: 232–233). Water routes could be used for the purposes of transport and trade (Kautilya *c*.300 BCE: 623) and the principle of good neighborliness was a civic duty. The modern day riparian laws are very close to this concept.

Colonial Period

European colonization brought three major influences—a transformation from a resource gathering and food production economy into a commodity-oriented economy; a change in long-standing social relations and customs as local social relations became less important and social cohesion declined (Gadgil and Guha 1992, 116).

The state gradually took ownership of forests and community irrigation and usufructuary schemes were dismantled. The British Common law Jurist, William Blackstone, asserted that "water is a moving, wandering thing, and must of necessity continue common by law of nature; so that I can only have a temporary, transient, usufructuary property therein". (Webb, 1931) (Shah and Mehta 2007, 257). As a result, water logging and salinity problems increased and small-scale irrigation schemes broke down leading to impoverishment of the small farmers.

The British introduced the concept of government control over surface waters. Following the 1857 revolution, the British began to consolidate power focusing both on famine relief and the need to maintain the resource base of trade (Majumdar et al. 1978). The British began to invest in and regulate canals and irrigation facilities.

One of the most important enactments was the Northern India Canal and Drainage Act (1873), which regulated irrigation, navigation and drainage. The act recognized the right of the Government to 'use and control for public purposes the water of all rivers and streams flowing in natural channels, and of all lakes'. This led to the progressive strengthening of state control over surface water and the concomitant weakening of people's customary rights. This tendency was progressively strengthened (Cullet and Gupta 2009, 164).

Post Independence

Water laws in the post-colonial period were shaped by the legacy of colonial times. Many colonial acts have not yet been superseded and the basic structure of common law rights linking water rights and land rights has not yet been comprehensively reworked (Singh 1991). The increasing displacement of customary and local rules and practices by formal state or central laws has been a continued colonial trend.

The Constitution provides for the continuation of all laws in force at the time of the adoption of the Constitution (Constitution of India 1947: art. 372). It generally follows the scheme introduced in the Government of India Act (1935), where water is a state subject. States have the exclusive power to regulate water supplies, irrigation and canals, drainage and embankments, water storage, water power and fisheries (Constitution 1947: Schedule 7, List 2, Entries 17, 21). There are restrictions regarding the use of interstate rivers (Schedule 7, List 1, Entry 56).

Since independence, states have enacted irrigation laws that generally follow the pattern of colonial legislation. Surface water irrigation legislation until the 1990s displays little novelty in terms of basic legal principles. The Rajasthan Irrigation and Drainage Act (1954: §5) maintains the right of the state to determine whether surface water is to be used for irrigation or drainage schemes based on whether the scheme serves 'public purposes'. In Madhya Pradesh, not only has the 1931 Irrigation Act been maintained but also the 1949 Regulation of Waters Act vested 'all rights in the water of any natural source of supply' in the Government (§3), as does the Bihar Irrigation Act (1997: §3a)(Cullet and Gupta 2009, 165-166).

This government control did not yield positive results. Seeing the effects of such colonial and centralized policies, brought an inadvertent rise of community ownership in the world.

Community Ownership: Learning from Experiences

Ghana

Ghana has a huge water supply deficit. In urban areas households do not have water flowing regularly through their taps. There are also households who are not even connected to the Ghana Water Company and therefore depend on tanker services for water. In the rural areas the situation is far worse where households have to walk several miles to access potable water sources or rely on unimproved sources such as rivers, ponds, etc. (Guo 2011, 2).

To curb these problems, in 1992 Ghana initiated the National Community Water and Sanitation Programme (NCWSP) to provide solutions to the problems of water and sanitation in rural communities and small towns. The goal of the Government through the Community Water and Sanitation Agency (CWSA) was to attain national water coverage of 85% by 2015.

A key component of the CWSA programme is the emphasis on community ownership and management. Among other things it entails effective community participation in the planning, implementation and management of the water and sanitation facilities.

The CWSA entails the following concepts within its definition:

- Community participation in the planning, implementation and management of the facilities and services.
- Adoption of appropriate and innovative technology to address water and sanitation problems.
- Conservation and management of water resources for present and future needs (CWSA, 2004).

It is believed by the planners of the program, that as custodians, communities will ensure the sustainability of these systems. Since its operations, thousands of water systems have been provided in small towns and communities all over the country (Entsua-Mensah et al. 2007, 2).

Ghana's water resources are derived from two main sources namely surface and groundwater. The surface water resources are mainly from three river systems draining the country – the Volta, South Western and Coastal river systems – constituting 70%, 22% and 8% respectively of the total land area of about 240,000 square kilometres of Ghana. Apart from this the only important freshwater source is the Lake Bosomtwi, which is a meteoritic crater located in the forest zone, with a surface area of 50 square kilometres and a maximum of 78 metres depth (Ministry of Works and Housing, 2005).

The CWSA organized its communities based on the data provided below:

Table 3: Different levels of organization within the CWSA

Level	Organisation	Information type	Key respondent(s)
National	Ministry of Water Resources, Works and Housing, CWSA	National policy relating to water and sanitation	Director, Directorate of Water, Director of Technical Services, CWSA
Regional	CWSA Regional Office	Data on implementation of the community water and sanitation programme in the region	Regional Officers
District	District Assembly	Data on water and sanitation systems in the district and the status of the programme	Water Liaison Officer/ members of the District Water Sanitation Team
Community	Small town suburbs/ villages	Data on water and sanitation systems in the communities	Community Water and Sanitation Committee (WATSAN) and Water and Sanitation Development Boards (WSDB)
Individual	Households	Information on the perception of consumers of the water and sanitation services	Consumers

(Entsua-Mensah et al. 2007, Table 2.1, 7)

At the national level, the water resources are managed by Ministry of Water Resources, Works and Housing and the Community Water and Sanitation Agency (CWSA). In the districts, the members of the DWST manage the water resources. The administrative and political head of each district is the District Chief Executive. In the communities, the members of the Water and Sanitation Committee and the Water and Sanitation Development Boards (WATSAN/ WSDB), directly interact with the communities and manage resources.

Assessment of the Implementations:

- The program increased the coverage of water from 27% before the implementation of the program to 60%. Some communities have got access to water and sanitation facilities, thereby reducing water and sanitation related diseases, it has also helped solve the problem of acute water shortages in the community.
- The project has been successful especially the on-the-job training which has equipped project staff to deliver efficiently.

- There is a high patronage from the communities
  (Entsua-Mensah et al. 2007, 28)

The level of community participation, resulting from this scheme is astounding. An example of Brong-Ahafo region shows us the increase in community participation.

Community Participation in Water Project:

Table 4: Level of participation within a community Ghana

Type of Support	Frequency	Percent
Part of planning team	9	6.4
Cash contribution	74	52.9
Maintenance	12	8.6
Labour	23	16.4
None	22	15.7
Total	**140**	**100.0**

(Entsua-Mensah et al. 2007, Table 6.6, 42)

The example of Ghana shows how positive growth can happen in the water services sector through community participation. The centre has the authority to make this shift through policy change. The CWSA incentivized the communities to community participation through job training and monetary support. In the process, these communities learnt ways of becoming self sustaining and independent. 5% of the cost incurred in the construction of water ways was taken from the communities to ensure their dedication towards the projects.

Kerala

Faced with acute water scarcity and the unreliable service of the State water authority, small groups of villagers of Olavanna Gram Panchayat in Kozhikode district have been organizing themselves into groups, collecting money, setting up small piped water supply schemes, and

meeting their own water supply needs, rather than depending on the State Government (Water and Sanitation Program 1999, 1).

The Olavanna Gram Panchayat in Kozhikode district had a drinking water scarcity problem. The 3 rivers, flowing through the Panchayat are saline. Other non-saline surface water bodies in the Panchayat go dry in February, as summer sets in. The water scarcity forced people (and women in particular) to walk long distances to get water for their daily needs.

At that time, there was only 1 Kerala Water Authority (KWA) scheme in the village providing uncertain and erratic water supply to just 1,600 of the 7,100 households. The villagers, fed up with the KWA scheme, picketed the Gram Panchayat (GP) office, demanding drinking water schemes. Seeing the condition, the GP promised to provide drinking water schemes in the village.

In 1987, the first piped water scheme was launched in Vettuvedankunnu Ward of the Olavanna Panchayat .The Vettuvedankunnu scheme consisted of an intake well, an overhead tank, and pipelines to distribute drinking water, through public stand posts, to serve 400 households. Since 1987, the GP and the Block Panchayat have built 18 piped water schemes, which provide drinking water through public taps as well as house taps to 1,362 families (Water and Sanitation Program 1999, 2).

Institutional and operational arrangements:

The president and the retired school teacher:

The scheme initiated by the GP generated a lot of interest in the 3 villages. The GP President realized that local needs required local solutions. However, given the financial constraints, which were discussed openly in the GP meetings, a retired school teacher had a novel idea in 1989. He collected money from the community and installed a small 1 HP pump with an intake well to service 5 neighboring families in the hamlet of Kambiliparamba. The GP supported this initiative.

The village and the other villagers realized that instead of helplessly agitating against the KWA and the GP, they could themselves solve their drinking water problem. This could be done at a low cost and, as they themselves managed the project, they could organize the service according to their requirements. This scheme serving just 5 households was soon to herald a new era in rural drinking water supply in Kerala.

Encouraged by this initiative and supported by the GP President, 54 other households of Kambiliparamba got together in 1989, and, with a contribution of Rs. 4,500 each, formed a registered co-operative Society to provide drinking water for their own needs.

From 1991 onwards, several such private Societies have been formed and similar small piped water supply schemes commissioned (Water and Sanitation Program 1999, 2).

After enlisting all households who wish to benefit from a piped water supply scheme, the beneficiaries get together, draft their by-laws and register their co-operative Society (under the Co-operative Societies Act of 1860). This process was facilitated by the GP, which in turn supports a group of individuals who are willing to mobilize the beneficiaries and take the responsibility of running the project in an open and democratic manner.

Members of the Society are asked to pay their membership fees, which varies from Rs. 4,500 to Rs. 12,500 per household. The amount differs across Societies because the costs of individual schemes vary. Land is purchased for the open well and for the overhead storage tank. The location of the well is arrived at by consensus (Water and Sanitation Program 1999, 3).

Local Technical enterprise:

Local expertise construct (or renovate) the well and the storage tank, and lay the pipelines. Beneficiary families provide voluntary labor as per the skills required from time-to-time in the scheme. This is addition to the cash contribution. If electricity is available, an electric pump is bought and installed. If not, a diesel pump is purchased. Since many Olavanna residents work as construction labor in nearby Kozhikode city, they are familiar with the work of laying pipelines and constructing water tanks. This experience has given them the confidence to undertake the construction of the piped water schemes without technical assistance from outside the village. Nearly all of these schemes are constructed within 2 to 4 months. The quality of construction is good and, compared to KWA-constructed schemes, these have lower material and labor costs. This is an aspect that even the KWA acknowledges (Water and Sanitation Program 1999, 4).

Even poor families contribute to private schemes:

Although several residents of Olavanna are fairly well-off by rural standards, there are some relatively poorer families in the GP. It is interesting to note that membership to the private Societies is, not restricted to the well-off. Even poorer families contribute to private schemes, paying their initial contribution in installments. The reason is straightforward, as the GP President notes, “If the need is felt, the money can be found.” The GP President maintains that he has been sensitive to the issue of the poor families’ requirement for water and their ability to pay for it. In order to assist the poorer families, the Societies accept their contribution in installments.

In some Societies, the poor are given an opportunity to earn wages during the construction of the scheme, this way funding their contribution (Water and Sanitation Program 1999, 4).

Achievements of the community project:

Today, there are 26 such private co-operative Societies operating in the GP and 6 more Societies are in the process of constructing their schemes. The GP has successfully shifted its role from being a provider to a facilitator and it has performed the regulatory function to sustain and encourage this novel project for the last 11 years. The GP does not provide any funds to these Societies, as capital costs or for the operation and maintenance (O&M). The funds are internally managed within the community. It also needs to be noted that not a single scheme out of them has failed till date(Water and Sanitation Program 1999, 3)

Orissa

The idea of participatory irrigation management is not new to Orissa. It dates back to the 70s. The concept was extensively promoted in the 90s under the Orissa Water Resources Consolidation Project, where four pilot water user associations (WUAs) were established. In September 2000, the Chief Minister launched a program to expand the concept to cover all major, medium, minor and lift irrigation projects in the state. At the same time, the term WUA was replaced by Pani Panchayat (PP). Along with this, The Orissa Pani Panchayat Act (2002) and the Orissa Pani Panchayat Rules (2003) were also formalized. By end of 2008, 15,500 Pani Panchayats were successfully formed, representing an area of more than 1.5 Mio. Ha. (Million hectare) (Swain 2009, 5).

The primary objectives of the Pani Panchayats were to:

- To create awareness among farmers in the irrigated commands towards the benefits of formation of Pani Panchayat.
- To create a feeling of unity and brotherhood among fellow farmers.
- To create a feeling among the farmers to visualize the created irrigation potentials as their own rather than that of Government.
- To build up confidence among farmers regarding better returns once equitable, timely irrigation supplies are assured.

- To convince farmers to go for cash crops under crop diversification program to get better returns on their investments.
- To arrange training and workshops at State, District, Block and Panchayat levels with the help of experienced resource persons on PIM. (Mohanty et al. 2005, 29)

Formation and Working:

Pani Panchayats are formed on a three tier system with two informal associations and one formal association.

- *Chak committee is formed taking farmers:* one each from high land, middle land and low land areas of an outlet. A representative from the *Chak committee will be a member of the* executive body of the Pani Panchayat.
- Each beneficiary within the concerned minor/sub minor qualifies to be member of the concerned Pani Panchayat.
- To be eligible as a member in Pani Panchayat, a token money of Rs.10 or as is decided by the committee is collected as membership fee. Registration of the Pani Panchayat can be done along with necessary documents like bye-law, general body resolution etc. by depositing those with the registering authorities.
- A fund may be created in the form of share capital from the members of Pani Panchayat in order to take up maintenance work of canals. (Mohanty et al. 2005, 29)

Launching of Pani Panchayat on a statewide scale

The Orissa Government, with a view to providing equitable, timely and assured irrigation has introduced the concept of Pani Panchayat. The concepts would finally lead to transfer of tertiary irrigation networks (minor/sub-minors) to registered Pani Panchayats. The responsibility of operation and maintenance (O&M) of the reservoir/ diversion weir (as the case may be) dam, spillways, sluices, primary and secondary distribution networks etc. rest with the department of water resources, whereas the responsibility of O&M of the tertiary systems i.e. below minor and sub-minor would remain with the Pani Panchayat. The geographical extent of the programme covers the entire state comprising of about 16 lakh hectares of major, medium and minor irrigation command areas in all 30 districts of Orissa (Centre for Water for Life, n.d., 15).

The table below shows the organizational structure of Pani Panchayats in Orissa.

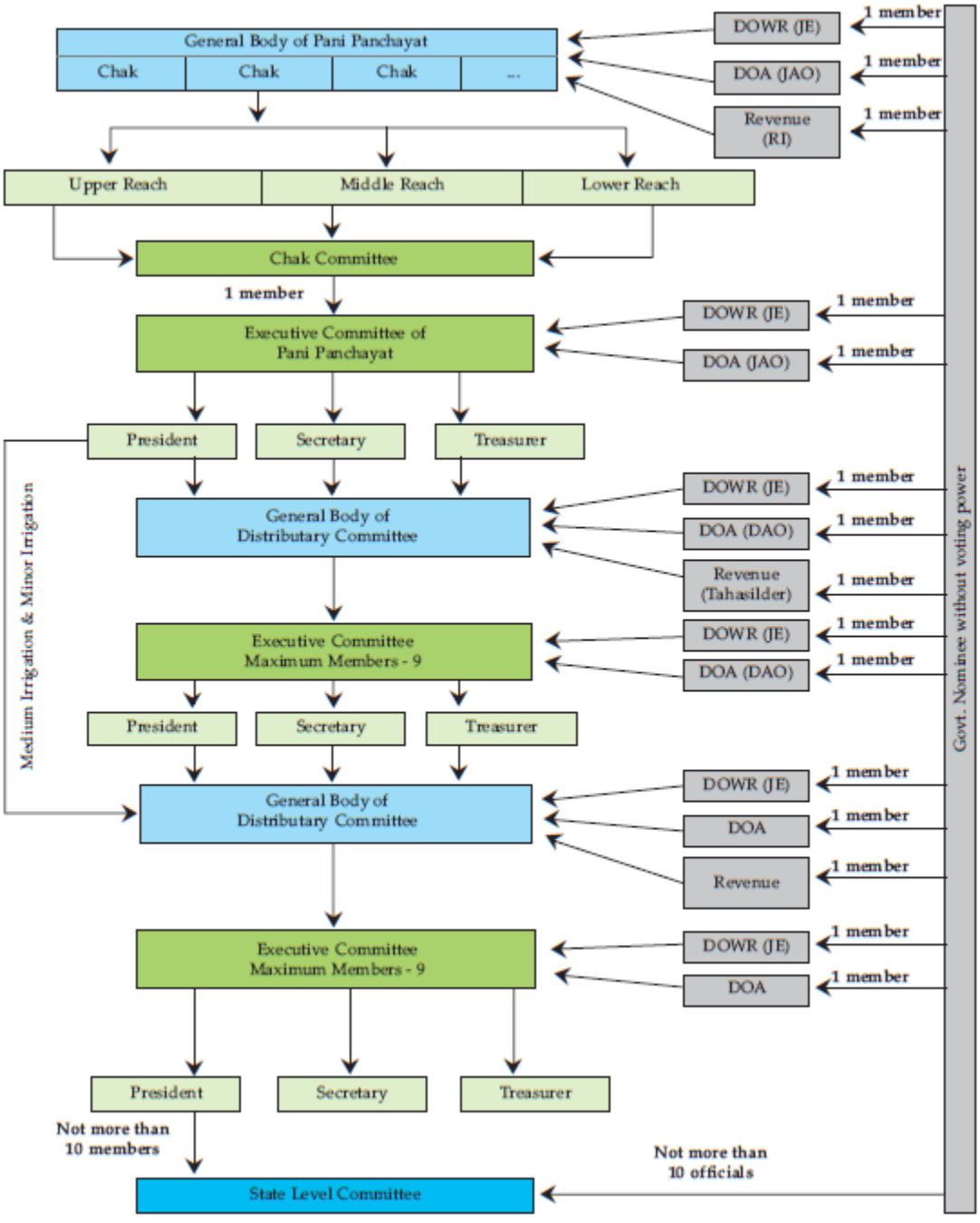


Chart: Organizational Chart of Pani Panchayat (Department of Water resources 2007, 85)

Advantages of Pani Panchayats:

There are many advantages to the formation of Pani panchyats. Some of them are listed below:

- Guarantee of getting full share of water through 'quota of water,
- Participation in operation, maintenance and management of the system.
- Freedom of deciding own cropping pattern within the allocated water.
- Through and timely maintenance for guarantee of drawing full allocated water.
- Better service and amicable settlement of disputes in the use of water.
- Right for suggesting (apex committee) improvements in the main system management, water delivery schedule etc. at the project level.
- Better assistance from department of agriculture in all aspects of crop husbandry.
- Own bank account for carrying out need-based maintenance.
  (Centre for Water for Life n.d., 16)

The Orissa government has taken up massive awareness campaign to make this program broad-based among the farmers of the state. The state government has already launched campaign through electronic media such as GramSat (Indian Space Research Organization, 2008), TV and Radio, the print media, conducting workshops and training programmes. (Centre for Water for Life n.d., 16)

The above example shows us how through water quotas, and land rights one can move a step forward from delegating the communities with duties to communities taking responsibility for themselves. It is in the interest of the community to build sustainable water works and through participation learning to become self sustaining.

Community Ownership of Yamuna

Important Definitions

Before we begin to understand community ownership and community management of Yamuna, there are a few basic terms that need to be defined and understood.

Riparian Rights:

A riparian owner is a person who has a natural right, arising out of the ownership of the land abutting upon the stream. A riparian owner has a right to use the water of the stream which flows past his land equally with other riparian owners, and to have the water come to him undiminished in flow, quantity or quality and to go beyond his land without obstruction (Chhatrapati 1990, 33).

Under the riparian doctrine, the right to use water arises from owning land bordering a river, stream, or lake. A riparian landowner has the right to the natural flow of the water passing his land not perceptibly retarded, diminished or polluted by others. Under the natural flow doctrine, a riparian may take all the water he or she requires "for domestic or natural uses," even if doing so drains the entire water source. Second, under the "reasonable use" or "American rule," a riparian may use a watercourse for any beneficial purpose so long as that use does not interfere unreasonably with the legitimate water needs and uses of other Riparian's (Babcock 2006, 1208).

Although the Easement Act 1882 legitimized customary rights of the people these were subject to the overriding provision of "any right of the Government to regulate the collection, retention and distribution of the water of rivers and streams flowing in natural channels, and of natural lakes and ponds, or of the water flowing, collected retained or distributed in or by any channel."

Tradable Water Rights:

Tradable permits can be used to allocate the amount of a given activity that each participant (or each member of a community) in that activity may undertake. They are often used either to limit the amount of a common resource that each participant can use or to limit the amount of pollutants that each polluter can emit. Tradable permits have also been used to sustain fisheries and regulate land use. Tradable permit schemes have typically been implemented as either a credit-trading or a cap-and-trade system. In a credit-trading program, each participant is allowed to engage in a standardized level of the activity, and if the participant uses or pollutes less than its allowed amount, it gains credit for that amount, which can then be traded with or transferred to a user who needs the surplus to exceed the allowable limit. For example, in a program to

reduce environmentally harmful pollutants, a polluter who emits less than the limit, gains an emission credit that can then be sold to a buyer who can then emit more than the limit (Puckett 2009, 1018).

A cap-and-trade system sets an overall level of use for a society and allows participants to trade use rights. Its implementation involves three steps:

- Determining the total level of acceptable activity;
- Allocating rights among
- Participants to engage in the activity;
- Permitting and facilitating trading of use permits. (Puckett 2009, 1018)

The primary goals of a cap-and-trade system are sustainability and achieving the most efficient allocation of the right to engage in the regulated activity. For example, in a cap-and-trade system to regulate pollution, the government would determine the acceptable level of total pollution for the society, and would then allocate the right to pollute among the participants in the polluting activity, with the aggregate of all the participants' pollution rights being equal to the total level of acceptable pollution. A participant in the activity is then given the choice to use its allotted amount, reduce use and sell its unused right, or buy additional rights to increase use. (Puckett 2009, 1019)

A primary distinction between the two systems is that one is able to limit total activity, while the other is not. Credit trading does not limit the aggregate amount of the activity because new participants can enter the process and increase the overall level of activity. In a pollution-regulation system, for example, new users can gain tradable credits simply by emitting less of the pollutant than the allowable limit; these new participants and the new credits that they generate would increase the aggregate level of activity(Puckett 2009, 1019)

Conversely, in a cap-and-trade program the aggregate level of the activity is defined without regard to the number of participants. New participants must purchase permits from existing users to have the right to engage in the activity, so the overall societal activity level or consumption does not change (Puckett 2009, 1019).

Community:

A community is defined as a group in face-to-face contact, bound by common values and objectives, with a basic harmony of interest and aspirations. Three important criteria are considered in this definition.

- The first concept of community has a physical component. It implies that a group of people living in a geographical area and interacting with one another.
- Secondly, they have characteristics in common which enable them to be identified as a group.
- Finally, a community should have a "basic harmony of interest and aspirations" (Fielmua 2011, 176).

Types of communities

Communities can be divided into three categories based on their intrinsic nature and their type of interaction with other communities. The below table lists out the three types of communities:

The first type of community is based on the geographical location of the people. The individuals comprising this community live in the same area. These communities come together to solve household problems like increasing water quality and sanitation, access to electricity etc. By pursuing their own personal goals, the communities work together in helping solve community problems. For example, Maria is a treasurer of the Honduran community of Guantincara. The role of the water committee is to organize weekly maintenance of system and treatment of water. For this purpose, Maria's task is to collect the fees from each household and keep track of the funds received for the operation and maintenance cost of these water works (Water.org, n.d.).

Occupational communities are those communities that may or may not live in the same area, but are united together due to their commonality of work. For example, Individual fishing quotas can help solve the problem of over fishing in certain communities. Once a fishing quota is set, the individual will be encouraged to fill his quota with big fishes rather than small ones. In turn the small fishes will be returned to the water and ensure the survival of the species.

The third kind are communities formed based on individual interest. For Example, Religious groups engaged in a mystical relationship with the river. In Hindu mythology, the river is treated as the daughter of Sun God, Surya, and sister of Yama, the God of Death, hence also known as Yami and according to popular legends, bathing in its sacred waters frees one from the torments of death.

Table 5: Types of Communities

Types of Communities		
Geogrphical Location	Occupational	Interests
•Slums •Villages •Urban residents welfare organizations	•Fishing •Agriculture •Poultry •Small and large scale industries •Health services	•Religious Communities •NGOs

Community Management:

There are three components to Community management that are crucial to its implementation—Responsibility, Authority and Control.

- Responsibility implies that the community takes ownership of the system, with all its attendant obligations and benefits/liabilities.
- Authority indicates that the community has the legitimate right to make decision about the system.
- Control implies that the community has the power to implement the decisions regarding the system.

  (Fielmua 2011, 176)

For the success of a community management model, there are certain key elements that need to be kept in mind.

- Contractual arrangements should be well defined. Community members should be clear about ownership, management and operation of the community and their own individual property.
- The service provider should be preferably close to their customers. (Which can be easily done if services are provided within the community itself)
- Systems are financially sustainable at affordable prices. (Prices of services should be set up by the group consensus within the community)
- Financial incentives in place to improve performance. (Through job creation and commoditization of water resources, so that the resource becomes an asset to the community that needs to be preserved)
- The regulatory and policy regime is supportive.(Government's role should shift from a provider to a facilitator) (Leathes 2012, 5)

The Model: Community ownership of Yamuna

The community ownership model relies on the proper functionality of the Panchayati raj system. Under the 73rd amendment, States are mandated to devolve functions relating to 29 subjects (including agriculture, land reforms, minor irrigation, fisheries, cottage and small scale industries, rural communication, drinking water, poverty alleviation programs etc.) to the Panchayats. It made it mandatory to have a decentralized mode of governance by giving greater decision powers to a three-tiered structure of Panchayati Raj Institutions (the village, the block and the district Panchayats). This legislation however, has varied extensively across the states and only a few have accounted for property rights as a means of empowering the communities.

The Process of Community Ownership

The process of community ownership involves a number of steps.

1. Changing the role of government—from provider to facilitator
2. Proper demarcation of private property.
3. Bringing the private property holders together.
4. Formation of a community water management committee
5. Deciding community by-laws (that do not hamper or obstruct the laws and rights of other water communities)
6. Operation and maintenance

The idea behind the formation of a community is that each community is in liberty to form its own committee, decide upon its own laws and handle the operation and maintenance in the way that community members want to (provided they do not hamper the right of other communities living of the banks of Yamuna)

1. Changing the role of the government

The first step is to change the role of the government from a provider to a facilitator. The Yamuna is not provided by the government. It needs to be owned by the people using its resource. Even though many would like to believe, Yamuna is not the property of the state. The government has failed to tackle the needs of the communities and the needs of the river. The government needs to take a step back and let the communities handle their own resource.

Like the Forest rights Act of 2006, a Riparian rights Act needs to be enforced. This will not only protect the rich, but even the poor who are at the moment living illegally on the banks of the river. The government does not and should not have the right to reallocate people to its own fancy.

2. Demarcation of Private property

An interesting example in understanding this is how the Forest Rights Act (2006) was implemented in Gujarat.

A pilot program, initiated by an NGO called, ARCH (Action Research in Community Health and Development) helped track the private properties of tribes through a GPS. Holding a GPS device, a tribal simply walked around the perimeter of his plot and pressed some buttons. The device automatically sketched a map of his farm, with the right latitude and longitude and exact area.

This enabled every family to produce a map of its holding, and get it verified by the gram sabha. All individual maps were then superimposed on a satellite image of the village dating from 2005 (the deadline under the Act). This produced a detailed map showing the exact size and ownership of every plot. Land disputes arose if two villagers walked over the same area, and disputes were settled by the Gram Sabha before certification. Any encroachment on forest land after 2005 showed up clearly after superimposing today's maps on the 2005 satellite image. This assuaged the Forest Department's fears. Thus a simple technology promoted by activist NGO provided a quick, elegant solution. The overall village map was then uploaded onto the internet, empowering any villager to go to an internet cafe in a nearby town and print out a copy.

There is no reason why a similar model cannot be applied on Yamuna. Through private initiatives the mapping of everyone’s riparian land rights can be done so as to protect the users (Aiyar 2013).

3. Bringing the private property holders together

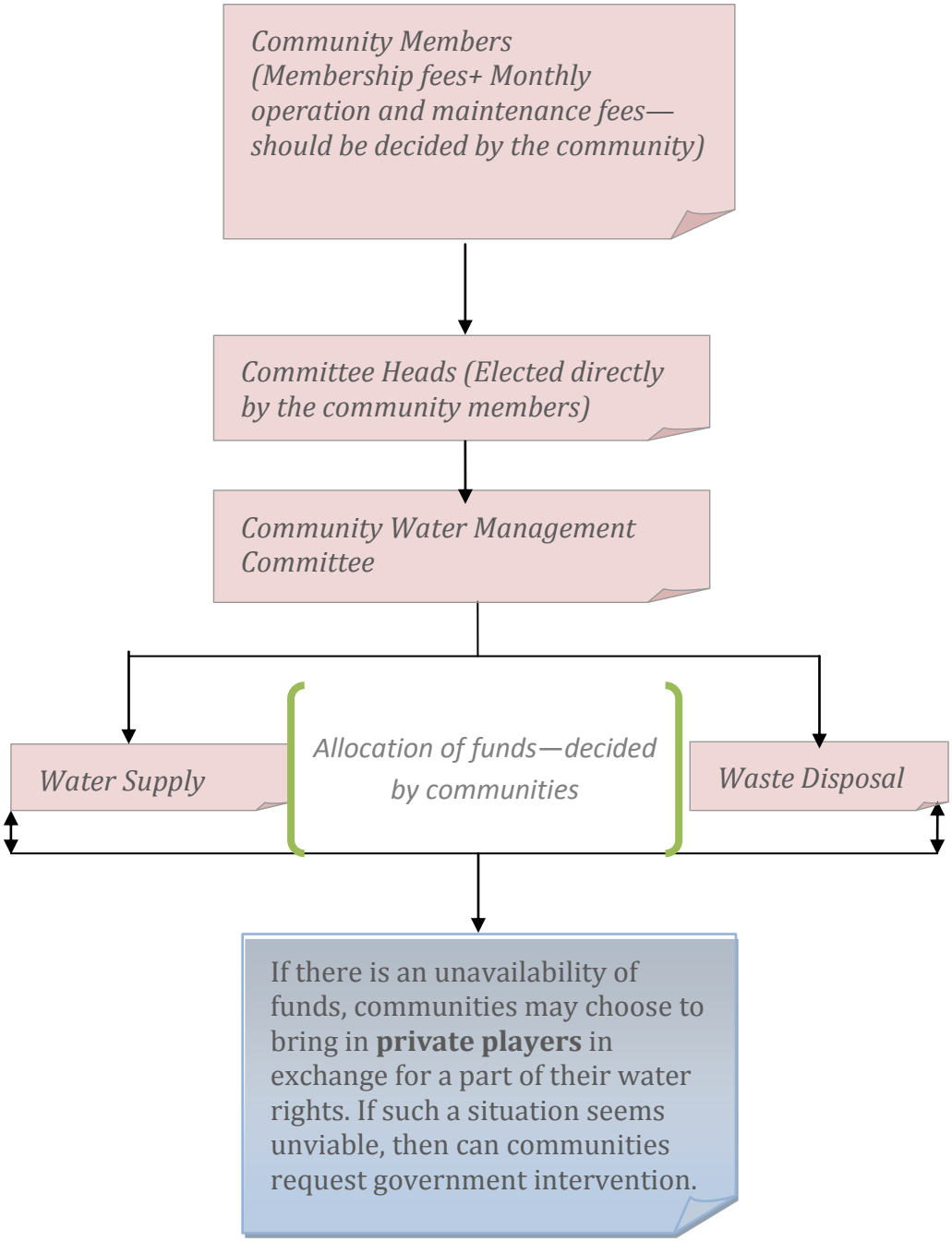
Where there is a need, there is a way. Once the communities are given complete ownership of the water, and are subject to riparian laws, where they have to respect other Riparians the need for community management of resources will arise. Instead of relying on the government to someday come up with a solution, the communities will take personal initiative to solve the issues.

4. Formation of a water management committee:

Scott Peck talks about the different stages in the formation of a community (Peck 1998)

- **Pseudo-community**: The beginning stage when people first come together. This is the stage where people try to be *nice*, and present what they feel are their most affable and friendly characteristics. They talk about the issues pertaining to them.
- **Chaos**: When people move beyond the in-authenticity of pseudo-community and feel safe enough to present their "shadow" selves. The facilitator, who acts as an initial leader brings upon the issues, and many ways are suggested to overcome the community problems.
- **Emptiness**: This stage moves beyond the attempts to fix, heal and convert of the chaos stage, when all people become capable of acknowledging their own sadness and broken backs, common to us all as human beings.
- **True community**: the process of deep respect and true listening for the needs of the other people in this community. This stage Peck believes can only be described as "glory" and reflects a deep yearning in every human soul for compassionate understanding from one's fellows.(At this stage a coherent behavior begins to start. Communities are now able to decide upon a leader (president) and are capable of formulating the rules that govern the community as a whole.

Although the communities have the right to form their own rules and methods of operation and maintenance, there is a placeholder model presented below:


Community Members (Membership fees+ Monthly operation and maintenance fees—should be decided by the community)
Committee Heads (Elected directly by the community members)
Community Water Management Committee
Water Supply
Allocation of funds—decided by communities
Waste Disposal
If there is an unavailability of funds, communities may choose to bring in private players in exchange for a part of their water rights. If such a situation seems unviable, then can communities request government intervention.

Deciding Community By-Laws:

A community is in full liberty to form its own laws. The only restraint would be that communities cannot hamper the riparian rights of other communities. This will provide an incentive to communities to come up with their own personal Sewage and waste treatment plants. The in-stream usage of water will be discouraged and an alternative system will be set up.

Communities unable to financially support themselves can then consult the government or private companies for assistance. With their help, the communities can set up various water works, and in exchange offer them a part of their tradable water rights on a temporary basis.

5. Operation and Maintenance:

There are certain factors involved in the operation and maintenance of water works in a community.

- Skilled Labor
- Capital
- Entrepreneurship/ management
- Resource—Yamuna

The creation of skilled labor is a process. India has an abundance of labor that has always worked for others. Today, there are many slum dwelling communities living on the banks of the river that have their main occupation as construction labor in urban areas.

Like in Orissa and Kerala, this labor can very well be trained to manage their own resource, and even the resource of others. This will not only lead to job creation, but also help them become independent of state interventions at time of calamity.

Capital can be created through a resource. The communities have a number of incentives to own as well as manage the Yamuna. Yamuna today caters to the needs of 57 million people. The

price of using this resource today goes to the Government. If this is shifted back to the community, they can have a huge incentive to take care of the resource through capital creation.

Interaction amongst the Stakeholders: Their incentives

- Fisheries: Fishing communities benefit from a clean river, as only then can the fishes survive. The Yamuna today is called a dead river for this very reason that life has ceased to exist within it. Over a period of time, fishing communities have also reduced in number along the banks of the river. Once the right of the people to the river is restored, communities will be able to come forward and look for means to earn income. One method is through fishing.

- Hydropower: There are currently 8 major hydropower projects on Yamuna and Ganga. Their combined generation is of 2234 MU per day. There is no reason why these projects should be owned by the government and not the people directly. Sure they were built by the state, but that was through the tax payers' money at the cost of the communities living on the banks of it. If these projects are given in the hands of the communities, they will have an incentive to encourage the construction of such projects. This can offer a mode of income for the communities.

- Industries: Various industries, like the paper mills in Yamuna Nagar and metal industries in Jagadhari, are extremely water intensive industries (Bhasin et al. 2008). The usage of this community owned resource, should be remunerated to the people, this can very well offer a mode of income to them as well as encourage sustainable technology that minimizes the damage to the river.

- Food and Agriculture: This is a fairly obvious incentive. It was found in a TERI research that the crops grown in Wazirabad and other regions of Delhi from water taken directly from the river had a very high percentage of metal in them (TERI 2012). These metals are highly carcinogenic. For clean and healthy production of agricultural goods, one needs a clean Yamuna.

- Ecotourism (aesthetic and recreational value creation): Ecotourism is an extremely innovative and productive way of using a natural resource. This has been done to a level

of perfection in the Chilka Lake, Orissa. The Chilka Lake is a community owned resource where they have now established ecotourism. This has not only become their mode of income, but protecting the river has been incentivized through ownership.

- Afforestation around river banks: Communities have a huge incentive to encourage afforestation around river banks. Trees offer a great barrier between the river channel and the settlements. At times of floods, they are able to control a certain amount of water entering the settlements. They also help in reducing soil erosion of cultivated land due to the vigorous flow of the river.

- Damage Remunerations: At times when one riparian, over rules the rights of another riparian to the river, damage remuneration offers a mode of income. However, the price remunerated should always be three times the profit earned out of the damage. Only then will industries have a disincentive to pollute the river.

The below table shows how community ownership can offer a solution to the 5 major problems faced by Yamuna today:

Table 6: Community Approach to solving the problems of Yamuna

Problem	Causes	Effects	Community Approach to the Problem
River pollution	1. Lack of proper sewage disposal systems 2. Unorganized dumping of wastes in to the river—Solid waste and sewage waste 3. Lack and inefficiency of	1. Serious health issues that could lead to death 2. Pollutants found in the agricultural produce 3. High level of metal in vegetables grown from Yamuna water 4. Loss of aquatic life—extinction of species, due to eutrophication 5. Biological Imbalance	1. Community ownership: Once communities have a riparian right to the water without being overruled by the state, they can start investing in projects that are beneficial to the communities. 2. Riparian laws state that one can only use a resource till he point that it does not damage the right of another user to use

	sewage treatment 4. Communities have no ownership of the river hence the responsibility lies completely with the government 5. Knowledge gap	6. Aesthetic loss	the resource—Damage remuneration in such a situation is a effective solution. 3. Through the enactment of riparian laws, communities will be obligated to make sure that they "clean up their mess" before they decide to dump in the river. 4. Providing incentive to communities through Tradable water rights: Credit trading
Lack of technical training among communities	1. The communities are not educated enough to handle technical problems related to various water works 2. No obligation to take care of their own resource, it has always been the government's duty 3. Dependency on government run	1. Creation of dis-link between the resource and the people using it. 2. Incapability to act during time of natural disasters—floods and droughts 3. Loss of independence	1. Providing training to communities in exchange for temporary water rights (this can be done through private sector involvement) 2. Increasing community participation in various water work projects such as: construction of dams 3. Providing incentive to the communities to take care of their resource which in turn encourages the need for technical education

	projects		
Resource allocation	1. Excessive allocation of water resources to Industrial projects 2. Lack of discretion among up-stream users for the needs of the downstream 3. Lack of knowledge among farmers regarding the accurate need for irrigation—resulting in over-irrigation 4. Exhaustible nature of the resource	1. Draughts in certain areas, despite being situated on the banks of a river 2. Loss of agricultural produce-- famines 3. Water scarcity 4. Illegal construction of water works (motors and pipes for illegal extraction of water)	1. Through riparian laws, the communities will have a say over their own resource and how much has to be allocated where. 2. They can through tradable water rights (first handed over to the communities) give temporary water rights to the industries in exchange for whatever they deem worthy 3. Once property rights are diligently allocated, people can assert their rights over a resource without having large corporations overrule their right.
Loss of Aesthetic Beauty	1. Excessive pollution 2. Inability of communities to restore the ecological	1. Loss of ecological balance 2. Loss of vital aquatic life 3. Recreational Loss 4. Economic Loss—due to loss of eco-tourism, and recreational strength	1. Through riparian laws, communities will have the freedom to use the resource the way they wish to; if eco tourism turns into a profitable venture for communities, they

	balance—due to lack of resources and training 3. Excessive dependence on the government		will take it up. 2. Building sustainable Sewage treatment plants that return the water back to the river in the same state that it was taken. 3. Encouraging community participation in construction of sustainable STPs and water works
Conflicts among communities	1. ambiguous water rights 2. Exploitation by a few 3. Droughts in certain regions	1. Violence 2. Overpowering of a few due to political or economic strength 3. Loss of the right of an individual to clean water	1. Construction of conflict resolution schemes: Through Decentralized Panchayati systems. 2. Issues that spread from one district to another to be solved by regional courts 3. Definite water rights

Conclusion

The problems faced by Yamuna are not the kinds that can be solved over night. However, due to the self cleansing capacity of a river, even slight changes in actions greatly benefit it. Local communities are better equipped to handle the problems of Yamuna because they are directly affected by it. The government has for far too long tried to create a delink between the communities and the resources. In the name of 'common property', these resources have become a state property, with only the state's authority to pollute or clean the river. In the name of being 'uncivilized' it has accused the local communities of being a reason to the pollution and in turn shunned them of their own rights. The truth in fact, is quite the contrary.

Government schemes to clean the river are insufficient to say the least. They are unable to nip the problem in the bud and are instead more involved in damage restoration. Those efforts are meaningless unless the detrimental activities are transformed. It is however, wrong to blame the government. It is the system at fault which is unable to fully understand the simple and profound ways in which communities can not only take care of themselves, but also the natural resources around them.

Seeing the examples of Ghana, Orissa and Kerala shows us how when people take back their right to the water, they are able to create a sustainable future for themselves, as well as the environment. It is quite evident that these examples are no exceptions. Community ownership and community management of water resources have successfully been implemented in countries like, Namibia, Nigeria, Brazil and even Australia, and there is absolutely no reason why such practices cannot be mimicked for Yamuna.

Bibliography

1. Aiyar, A. A. S, "Poor Tribals in Gujarat finally get land rights, using GPS technology," *The Economic Times*, sec. Columns, Jul 21, 2013, http://economictimes.indiatimes.com/opinion/columnists/swaminathan-s-a-aiyar/tribals-in-gujarat-finally-get-land-rights-using-gps-technology/articleshow/21207478.cms

2. Babcock, H. M.," Reserved Indian Water Rights in Riparian Jurisdictions: Water, Water Everywhere, Perhaps Some Drops for Us," *Cornell Law Review*, Vol.91, 1203-1260, 2006.

3. Bhasin, S. K, Ajmer Singh and Jyotsna Kaushal, "Statistical Analysis Of Water Falling Into Western Yamuna Canal From Yamunanagar Industrial Belt And Its Effect On Agriculture," *Journal of Environmental Research And Development*, Vol. 2, No.3, 2008.

4. Centre for Water for Life, "State of Pani Panchayat in Orissa," n.d..

5. Chhatrapati, S., *Water Rights and Principles of Water Resource Management* (New Delhi: Indian Law Institute), 1991.

6. Christopher, Divya, Simarpreet Kaur, and Rachana Singh, "Water Quality Status of River Yamuna in Delhi with Reference to Presence of Heavy Metals: A Review," *International Journal of Pharma Medicine and Biological Sciences*, Vol. 1, No. 2 (2012): 268, http://www.ijpmbs.com/ijpmbsadmin/upload/ijpmbs_506d67987cbca.pdf

7. Cullet, Phillipe, Joyeeta Gupta, "India: Evolution of Water Law and Policy," *The Evolution of the Law and Politics of Water* (Dordrecht: Springer Academic Publishers, 2009), 158-166.

8. Dutta, Ritwick, *The Unquiet River An Overview of Select decisions of the Courts on the River Yamuna* (Delhi: PEACE Institute Charitable Trust, 2009).

9. Entsua-Mensah, R.M. , George Essegbey, Godfred Frempong, Charlotte Engmann, *Assessment of Community Water and Sanitation in Ghana*(Nairobi: ATPS, 2007).

10. Fielmua, N.," The Role of the Community Ownership and Management Strategy towards Sustainable Access to Water in Ghana (A Case of Nadowli District)," *Journal of Sustainable Development*, Vol.4, No.3, 2011.

11. Gadgil, M., & R. Guha, *The use and abuse of nature* (New Delhi: Oxford University Press, 1992), 116.

12. IL&FS Ecosmart Limited, *City Development Plan Delhi*, Oct, 2006, http://ccs.in/ccsindia/pdf/Delhi%20CDP_Pgs%201-172.pdf

13. Guo, J. N., *Cost Effectiveness Analysis Of Selected Water Projects In Ghana* (Ghana: Integrated Social Development Centre, 2011).

14. Khandekar, Nivedita, "No study to check air above Yamuna," *Hindustan Times*, May 4, 2012, http://www.hindustantimes.com/India-news/NewDelhi/No-study-to-check-air-above-Yamuna/Article1-850304.aspx

15. Leathes, B., Tim Hayward and Kwabena Nyarko, " Delegated management of water and sanitation services in urban areas: experiences from Kumasi, Ghana," *Topic Brief*, 3, Water and Sanitation for the Urban Poor, 2012.

16. Mahapatra, Dhananjay, "Poor infrastructure makes a mockery of RTE Act," *The Times Of India*, sec. Environment, Nov 10, 2012, http://articles.timesofindia.indiatimes.com/2012-11-10/pollution/35033843_1_najafgarh-drain-sewage-water-waste-water

17. Majumdar, R.C., H. C. Raychaudhuri and K. Datta, *An Advanced History of India* (Delhi: Macmillan, 1978).

18. Ministry of Works and Housing, (2005), National Water Policy (Final Draft), Accra, Ghana, CWSA ACT 564.

19. Mohanty, S.K. , Dr. Souvik Ghosh, Pradeep Kumar Gan, "Pani Panchayat and its Role in Irrigation Command of Orissa," *Orissa Review*, 28-31, 2005.

20. Naff, T. and J. W. Dellapenna, "Can there be a confluence? A comparative consideration of western and Islamic fresh water law," *Water Policy*, 4, 465–489, 2002.

21. Peck, M. S, *The Different Drum: Community Making and Peace*(Touchstone), 1998.

22. Puckett, W. P., "Trading Water: Using Tradable Permits To Promote Conservation And Efficient Allocation Of An Increasingly Scarce Resource," *Emory Law Journal*, Vol.59, 2009.

23. "Satcom Applications," Indian Space Research Organization, 2008, http://www.isro.org/scripts/sat_GRAMSAT.aspx

24. Shah P. J., Ambrish Mehta, "Managing Water Resources: Communities and Markets ," *Terracotta Reader: A Market Approach to the Environment* (Academic Foundation, 2007), 255.

25. Shrivastava, K.S , "Clean Ganga and Yamuna mission a failure," *Down To Earth*, sec. Web Specials, May 18, 2012, http://www.downtoearth.org.in/content/clean-ganga-and-yamuna-mission-failure

26. Siddiqui, IA, "History of Water Laws in India," *Water Law in India* (New Delhi: India Law Institute, 1992), 289.

27. Singh, C., *Water rights and principles of water resources management* (Bombay: N.M. Tripathi, 1991).

28. Swain, Debaraj, "Orissa's paani panchayats – a case of successful irrigation management," *Small Publications*, Series 4, 5, 2009.

29. Water and Sanitation Program, "Villagers Treat Water as an Economic Good, Olavanna, Kerala, India," *Small Private Initiatives Field Notes* (DFID, 1999).

30. Water.org, "Something Every Community Supports," http://water.org/post/celebrating-water-involved-communities/

31. "Worsening position of Yamuna water revealed under RTI," *rtifoundationofindia.com*, Jun 1 , 2012, http://www.rtifoundationofindia.com/worsening-position-yamuna-water-revealed-under-rti-1635#.Ue17jI1gd8E

32. "Yamuna basin organization," Central Water Commission, Aug 08, 2007, http://www.cwc.nic.in/regional/delhi/welcome.html

33. "Yamuna, the poisoned river," The Energy and Resources Institute, Jan 31, 2012, http://www.teriin.org/index.php?option=com_ongoing&task=about_project&pcode=2008EE06