

INDIA WATER MARKET SCAN



EXECUTED BY: ROEL SPEE, STUDY ASSOCIATION STAR

FOR: NETHERLANDS WATER PARTNERSHIP

FUNDED BY: PARTNERS VOOR WATER



Table of Contents

Preface	4
Executive Summary	5
Introduction	8
The Indian Water Sector	9
The Structure of the water sector in India	12
Hydraulic Engineering	14
Sustainable Dredging	14
Dams and flood barriers	14
Port development	14
River development	15
Off-shore engineering	15
Coastal development	15
Water Management	16
Urban water management	16
Seasoil and groundwater	16
Subsidence and desalination	17
Integrated river basin management	17
Coastal development and land reclamation	17
Water & Vegetation	18
Water productivity and food production	18
Alternative water sources	18
Drinking Water & Industrial Water Supply	20
Decentralized (point of use) household level	20
Non-piped / decentralized municipal supply	20
Optimising the process chain	21
Management contracts for plants	22
Water quality	22
Mains	22
Wastewater	23
Sensing, monitoring and control	23
Industrial recycling of process water	24
Recycling of wastewater	24
Carbon-nitrogen cycle	24

Outsourcing	25
Regional focus	25
Financial and Non-financial services	26
Challenges and Advises	29
Conclusions	31
Recommendations for NWP	33
Further research	33

Preface

All over the world the Netherlands is famous for its accomplishments in the field of water. In order to capitalize on this, water has been earmarked as one of the four key areas of the Dutch economy. The goal is to double the export turnover in five years and to contribute significantly to addressing global water issues (MDGs). The water sector (including trade organizations and industries, governmental authorities, research institutes and non governmental organizations) have developed a strategy to meet such and end. The strategy focuses on several high priority countries and themes in which the Netherlands possesses extensive or unique knowledge.

Among the members of the NWP, India is marked as one of the high priority countries. On the 6th and 7th of February 2007 the Foundation for Critical Choices for India, the Netherlands India Chamber of Commerce and Trade and the Netherlands Water Partnership organized a water technology seminar in the Netherlands. Various delegates from the Netherlands and India participated. Based on various presentations and discussions, the participants concluded that there is a need and scope for structural cooperation between the 2 countries relating to the water issues that India faces. A long term strategy has to be developed with various stakeholders to meet such an end.

This market scan aims to be supportive for all water related organizations who are interested in India. It is a practical guide to get a first impression of the Indian Water market and could not have been completed without the help of several people. Firstly Peter van der Linde of the NWP who overlooked this market scan. Secondly Ravi Jambagi who shared his insights in the Indian market with me. Thirdly thanks to Theo Groothuizen and Maya Acharya for their great support. And finally thanks to all the experts that I have spoken to during this research.

Roel Spee

In cooperation with

Peter van der Linde (NWP)

Ravi Jambagi (FCCI)

Theo Groothuizen (Royal Netherlands Embassy in New Delhi)

Maya Acharya (Royal Netherlands Embassy in New Delhi)

Executive Summary

It is a rare morning when water trickles through the pipes in Delhi. More often, not a drop will come. In the richest city in India, with the nation's economy marching ahead at an enviable clip, middle-class people are reduced to foraging for water. Their predicament testifies to the government's challenge to deliver the most basic services to all its citizens at a time when India asserts itself as a global power.

The crisis, decades in the making, has grown as fast as India in recent years. Soaring populations, the warp-speed sprawl of its cities, and a vast and thirsty farm belt have all put new strains on the water and sanitation network. The combination has left water all too scarce in some places, contaminated in others and in cursed surfeit for millions who are flooded each year. Today the problems threaten to stand in the way of India's ability to fortify its sagging farms, sustain its economic growth and make its cities healthy and habitable. At stake are not only its economic ambitions, but also its very image as the world's largest democracy.

In Delhi's case, the city can neither quench its thirst nor adequately get rid of the ever-bigger heaps of sewage that it produces. About 45 percent of the population is not hooked up to the public sewage system at all. Those issues are amplified across the country. More than 700 million Indians, or about two-thirds of the population, do not have adequate sanitation. Largely for lack of clean water, 2.1 million children under the age of 5 die each year, the United Nations has reported. Delhi's population, now put at 16 million people, has expanded by about 41 percent in 15 years, officials estimate. As the number of people living - and defecating - in the city soars, on average less than half of the sewage they pour into the river is treated.

Regarding the urgency of this issue, the Indian Government has opened her eyes and is willing to admit the problems. The investments in this sector are increasing. But as the Commonwealth Games (CWG) of 2010 are coming rapidly, the world will see both the opportunities and the problems of India. The CWG of 2010 can prove to be a benchmark on how far the domestic growth has come. With that in mind, the CWG are also an element which will generate major foreign investments. This applies to drinking- and wastewater installations, as well as to industrial water supply.

The following table gives an idea of themes in which the Netherlands possesses extensive or unique knowledge and the opportunities for these sub-sectors in India. It is the result of extensive talks with several Dutch and Indian water experts.

Hydraulic Engineering

- Sustainable Dredging ● ● interesting
- Dams and Flood Barriers ● ● interesting
- Port Development ● ● interesting
- River Development ● less interesting
- Off-shore engineering ● less interesting
- Coastal Development ● less interesting

Water Management

- Contaminated sea soil and groundwater ● ● ● very interesting
- Urban water management ● ● ● very interesting
- Subsidence and desalination ● ● interesting
- Integrated river basin management ● less interesting
- Coastal development & land reclamation ● less interesting

Water & Vegetation

- Water productivity and food production ● ● ● very interesting
- Water distribution and quality ● ● ● very interesting
- Alternative water sources ● ● interesting

Drinking water & Industrial water supply

- Decentralized (point-of-use) household level ● ● ● very interesting
- Water for industrial processes ● ● ● very interesting
- Non-piped / decentralized municipal supply ● ● interesting
- Management contracts ● ● interesting
- Water quality ● ● interesting
- Mains ● less interesting

Wastewater

- Sensoring, monitoring & control ● ● ● very interesting
- Industrial water recycling ● ● ● very interesting
- Recycling of wastewater (household level) ● ● ● very interesting
- Carbon-nitrogen cycle ● less interesting

It's clear that the water market in India is full of opportunities. But it's a difficult market with a lot of challenges that are to be faced, as this report will show. The (institutional) complexity, bureaucracy and competitors are seen as obstacles, so taking and investing time is important. Adapting your technology or product to the mass market of India (with a focus on low-prices) can be very challenging as well.

Concluding, it may be obvious that the Indian market is a rapidly growing one and that investing in this enormous country creates many opportunities. It is thereby advised to have a regional focus, while adapting a national agenda.

Introduction

The importance of water in India has increased considerably as a result of a few recent developments. The population has grown very rapidly, the economic growth in the context of globalization, the increasing demand for industrial water, the reduction of groundwater and the demand for irrigation in the agriculture, are all examples that indicate that chances on the market for water-management in India are numerous.

The achievements of the Indian economy have not stayed unnoticed in the Netherlands. The importance of India as a world economy is followed closely by a lot of Dutch companies. Especially since India is a BRIC-country*, companies are avid to invest in the South-Asian country. Most players in the industry agree that there is a tremendous scope for expanding the market and that there is room for all.

However, there also is another 'side' of India. Besides the economic growth, India has the greatest number of people living below the poverty line with 28% of the population of 1.1 billion people living in poverty nowadays. Just 15% of the rural population has access to a toilet, meaning that 29 million people need to gain access to basic sanitation every year if the Millennium Goal of halving the amount of people without sanitation by 2015, is to be met.

This Millennium Goal sets the standard for the road that India wants to take in the upcoming decades. Enormous amounts of money are being invested to succeed and reach this goal.

Vision 2020

India aims to become a developed nation by 2020. The 'Vision 2020' includes a strategy on how to reach that goal and be among the world's first five economic powers by that time. Water plays an essential role in that strategy to ensure that food production grows for the increasing population. Drinking water, health care and sanitation are very important to decline the populations' growth rate. More information: 'India 2020: A vision for the New Millennium' by Abdul Kalam with YS Rajan.

* BRIC-county is a term used to refer to the combination of Brazil, Russia, India and China. The argue of the Goldman Sachs report of 2003, was that the economies of these countries are rapidly developing and by the year of 2025 will contribute more than 40% of the worlds growth.

The Indian Water Sector

The Indian market is large but challenging in many ways. It is growing with an annually 8 to 9% economically and even more in self-confidence. For the coming years double-digit growth is hoped for, if the present boom continues. The gradual reform of the last decade, initiated by the government, has led to political stability on central level. Official figures are showing that poverty is on the decline, although nobody can deny, that poverty and deprivation of basic services remains a huge problem, especially in remote regions.

Otherwise, the government is being criticized by organizations as the World Bank. They state; 'India will face a turbulent water future, unless water management practices are changed, and changed soon, India will face a severe water crisis within the next two decades'. In their opinion, the Indian government is too focused on economic growth, instead of facilitating in basic human needs. 'The way in which the government is managing water, India will either not have the water required for the economy, nor for the people'.

Concluding it can be stated that if adequate measures are not taken in time, not only the upward economic growth will be threatened, but other major problems will arise such as political conflicts or major outbreaks of diseases.

Role of the government and the Indian perspective

The role of the central government in sustainable management of water resources is and will continue to be critical. While the sovereign right of the central government on any natural resource like water is undisputed, the role a government should assume to exercise this right and it needs to be defined through consensus among stakeholders. The objectives and goals of water policy can not be achieved without appropriate water laws and efficient implementation mechanisms. Policy assertions have not got reflected into instruments that can give such approaches operative effect. Those instruments are of critical meaning in changing the water perception of the Indian people.

The old Indian perception of water is that this natural resource is available for everybody and there should be no price tag on this element. However, more and more people in urban areas become more aware of the necessity to pay for their water. The problems arise with the farmers in the rural areas whom still are not willing to pay for this resource. Existing

institutional, legal and governance frameworks relating to acquisition, distribution and utilization of water have not helped in changing this perception.

Law is a source to solve some of the problems related to water. There is hardly any country where there are no provisions to deal with water related issues. But not only must the law be a changing factor. The municipality's selves must also play an important part in the way to a better water-awareness. Local bodies can help (rural) communities in training and educating them on water usage, management and distribution issues. Since almost 90% of the water in India is used for agriculture and food production, farmers can be trained to work more efficient with the valuable water.

India is heavily dependent on the monsoon rains. With 16% of the worlds' population, 2,5% of land mass and only 4% of water resources, India has to take actions. How come that water scarcity is still threatening both rural and urban areas, as the average rainfall is the same as in Ireland?

Source of the problems

Regarding the urgency of this issue, the Indian Government has opened her eyes now and is willing to admit the problems and is looking for good solutions. Although the problems are rather complex, three issues contribute significantly to the problems;

- People were able to ignore the inconvenience of poorly functioning public systems and became **self-reliant using groundwater**. This private, self-provision strategy has been a 'success' and has underpinned spectacular gains in agricultural production and the rise of thousands of towns and cities. This has bred an attitude that the 'muddling through' was okay. However, in the long run, the public systems have to improve dramatically to provide water to the growing population.
- **Inefficient Government – State construction**. Every state has their responsibility on water supply. However, if a big project affects more than one State the decision will go to the Government in Delhi.
- For big projects the government is normally using tenders as a way of getting the **cheapest supplier**. These tenders have the problem that it takes very long to make a selection through all the paperwork. Most of the times, a tender will delay a project with approximately at least one year.

Overview of the major problems:

Drinking Water

- Inadequate and intermittent supply of drinking water
- Metallic and bacterial pollution of water
- Inadequate piped water supply in rural areas and some urban slum areas
- Loss of water in transmission (distribution) and storage
- Lack of financial resources for improvements,
- Inefficient pricing and billing system
- Insufficient local technological research on water
- Lack of integrated water management
- Inadequate enforcement of environment legislation relating to water
- Lack of control over-exploitation of groundwater resources
- Insufficient facilities for waste water treatment

Industrial Water

- Inadequate enforcement of special water regime for industries requiring considerable amounts of water
- Inability of municipal water supply organizations to meet increasing demands of existing and new industries
- Uncontrolled exploitation of ground water by some industrial establishments
- Safety of industrial establishments from surplus surface water and floods
- Lack of proper draining facilities

For detailed maps of the problem areas in India see **Appendix 3 & 4** on page 37 & 38.

The Structure of the water sector in India

Since India is an enormous country with over 1.1 billion people and water is considered to be a community good, the state government is taking responsibility for water related issues. Because of the large number of institutions that are related to water issues, this results in a bureaucracy with a complex structure.

General

India is a federated Union of States, constituted as a Sovereign Socialist Secular Democratic Republic with a Parliamentary system of government. At present there are 28 states and 5 Union territories but with some large states having been divided further, India will soon have 30 states officially. Delhi is the capital, and each state has its own capital. The most confronting problems arise by the distribution/devolution of powers among the states and the Union government when you're involved in a big state project.

Water related

At a central level, the **Ministry of Water Resources** is responsible for development, conservation and management of water as a national resource. They work very closely with the **Central Water Commission** in New Delhi. The Central Water Commission is a premier technical organization in the field of water resources and is charged with the general responsibilities of initiating, coordinating and furthering, in consultation with the State Governments concerned, schemas for control, conservation and utilization of water resources throughout the country, for purpose of flood control, irrigation, navigation, drinking water supply and water power development. For Delhi the **Delhi Jal Board** is responsible for the supply of drinking water throughout the city. The treatment of sewage is also a task for the Delhi Jal Board.

Secondly there is the **Central Ground Water Board** in Faridabad. They are entrusted with the responsibilities of hydro-geological surveys, exploration, assessment, development and management of ground water resources throughout the country.

The **Central Water and Power Research Station**, situated in Pune, provides comprehensive R&D support to a variety of projects in the areas of water and energy resources development and water borne transport.

Some examples of the **complexity**; urban water supply and sewage disposal is handled by the **Ministry of Urban Development** while rural water supply comes in the purview of the Department of Drinking Water under the **Ministry of Rural Development**. The subject of Hydro-electric power and thermal power is the responsibility of the **Ministry of Power**. Pollution, Environment control and water quality comes under the purview of the **Ministry of Environment and Forests**. Furthermore the **Ministry of Agriculture** is involved in the development of water resources because it deals with watershed development. In addition, the Ministry of Agriculture is also concerned with the popularization of drip and sprinkler systems of irrigation of water. Industrial use of water falls under the responsibility of the Ministry of Industry. All the involved institutions are listed in Appendix 1.

Cooperation

Because there are a lot of organizations that deal with water or water related problems, the **bureaucracy** is increasing in India. More and more 'Boards' and 'Commissions' are being set up but the efficiency of those bodies is doubtful.

There is no independent body like the NWP, which contains of NGO's, public organizations, private companies and knowledge institutes, in India. With such a body, the cooperation between the Dutch and Indian market could have been supported in an easier way. Now all the organizations, boards and commission are scattered and it is difficult to know where to go.

The following chapters give an idea of themes in which the Netherlands possesses extensive or unique knowledge and the opportunities for these sub-sectors in India. It is the result of extensive talks with several Dutch and Indian water experts. For each sector there are several opportunities, barriers and risks which are stated in the various chapters.

Hydraulic Engineering

Sustainable Dredging • •

Dutch companies in the dredging world are one of the main players in this field. More than 50% of the world-wide market for dredging is in hands of Dutch companies. However, the market for dredging in India is not as big as some players expect. The projects that will be of interest for the future are dredging activities in new, upcoming ports or port-related. One example is the Dhamra Port Company in Orissa which is building a harbor with the highest environmental conditions. Royal Boskalis NV. is also doing a big project in Andhra Pradesh where they build a big pipeline to the harbor of Kakinada.

Dams and flood barriers • •

India receives the second highest amount of rainfall in the world. One of the problems is that most of the rain falls in a very short period during monsoon from June till August. During that time too, the summer has just been past and massive amounts of water come down from the Himalaya through the rivers Ganga and the Brahmaputra.

These two activities cause a lot of problems in some areas. Flooding is a common thing during and after monsoon-time in cities like Mumbai and Calcutta. But also States like Uttar Pradesh, Bihar and West-Bengal suffer from flooding every year. Therefore the opportunities are there for the Dutch Delta Technology sector, specifically in the mentioned states.

Port development • •

As mentioned above, the ports of India are developing very rapidly. With a huge coastline India sees the opportunities to expand their activities into sea. But as the rest of the infrastructure, harbors are not equipped to these modern times. Port development therefore might provide good opportunities for Dutch experts.

River development •

The only project that is relating to the Indian rivers is the 'Interlinking the Rivers'-project. This is an ambitious project that is being discussed for over the last decade. Still there has not been any success on this matter. More information on www.indiatogether.org/2004/feb/env-badsci-p1.htm. Another issue regarding the rivers is inland navigation. Opportunities to use the rivers for transportation are present but in general this is still in an 'early phase'.

Off-shore engineering •

Worldwide spending on engineering services is predicted to grow from \$750m in 2004 to \$1tr by 2020, according to a report by Indian IT trade body Nasscom and Booz Allen Hamilton called *Globalisation of engineering services - the next frontier for India*.

Of that total \$1tr spend, around \$150bn to \$225bn is expected to be on offshore engineering services and India claims it is in a position to claim a quarter - about \$40bn - of that market.

Last year India had a relatively small 12 per cent share of the \$10bn to \$15bn offshore engineering services market.

The demand for engineering talent is growing, and emerging market countries such as India will play a vital role in expanding capacity. Companies will increasingly create competitive advantage by accessing and building core innovation capabilities in a world-class global network. But still significant investment in infrastructure, workforce and expertise by the private sector, government and academic institutions will be needed if India is to tap into the offshore engineering services market.

Coastal development •

The coastal zones in India are becoming more and more economically independent. But this is dependent on the upcoming ports. In the south-east states the organization COPDANET is trying to save the ecological parts of the coastal areas (www.copdanet.org).

Water Management

Urban water management • • •

One of the biggest problems in India is water distribution. As already mentioned there is enough water for everybody, but harvesting and distribution are still big problems. Over the last decades Indian people got used to utilising groundwater. Now many wells are going dry and they are forced to use rainwater instead.

In the urban areas many distribution systems are not working properly. Only 10% of the people in Delhi have access to 24 hour water supply by tap. Since most of the people live in the slums they have no access to a water tap. To get their water, they make lots of holes in the distribution system. These leakages cause many problems in these highly crowded areas. The result is that 30 – 40 % of the water supply in Delhi is not being paid for and other people in the city overpay for their water.

The absence of an urban water plan makes it hard to develop a good functioning distribution system. Especially because in the upcoming five years 300 million houses will be build that all need access.

Seasoil and groundwater • • •

Groundwater level

People were able to ignore the inconvenience of poorly functioning public systems and became self-reliant using groundwater. But now groundwater levels have dropped so far that this resource is not reachable anymore. Cities like, Chennai and Delhi suffer severely from this issue.

In fact the lowering of groundwater and the absence of groundwater knowledge are one of the most severe problems of India. The country lacks of groundwater management experts and a strategy to keep up the level at a reasonable level. Great opportunities are their for Dutch companies, institutions and NGOs to share their knowledge and invest in India.

Groundwater contamination

The contamination of groundwater is another severe problem that India suffers from. More and more companies are focussing on arsenic- en fluoride removal systems. A simple, low cost solution has a potential market of 200-300 million people. Because all the contaminated water from the industries is going into the ports and sea, the sea soil is becoming contaminated also. These are all results from the growing economy without environmental rules and regulations.

Thirteen states in India have been identified as endemic to fluoride; Andhra Pradesh, Gujarat, Haryana, Orissa, Punjab, Rajasthan, Tamil nadu, Uttar Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Bihar and Delhi. More than a half million people suffer from ailments, due to the excess of fluoride in their drinking water.

Arsenic contamination in groundwater has been reported in many parts of West-Bengal. The groundwater in Orissa and Assam has high iron content. The states Rajasthan, Gujarat, Punjab and Haryana have high incidence of salinity in their groundwater.

Subsidence and desalination • •

The contribution of membrane desalination plants is progressively increasing. A number of reverse osmosis desalination plants are being installed by industries to meet their increasing water demand. Since the early nineties, hundreds of membrane based brackish water desalination plants with capacities of 10 to 100 cubic metres per day were set up in order to provide safe drinking water to selected problem villages in the states of Gujarat, Rajasthan, Tamil Nadu and Andhra Pradesh. On the other hand, several thermal desalination plants have also been operating in the coastal areas of the country for in house use by industries.

Integrated river basin management •

The problems that river basin institutions in the developed world successfully address - such as pollution, sediment build up in rivers and the degradation of wetlands - are not the top priorities for Indian policy makers and people. The items that do top Indian agendas-providing access to water for drinking and growing food, eradicating poverty, and stopping groundwater overexploitation. This does not mean that India and other developing countries cannot learn valuable lessons from models for Integrated River Basin Management but opportunities in this sector are mainly there for locally operating NGOs in a 'community-based approach'.

Coastal development and land reclamation •

With 16% of the worlds' population, 2,5% of land mass and only 4% of water resources, India has to take actions. More and more people are migrating to the coastal zones leaving uncultivated land inwards. To increase the land-man ratio and to solve the water problems of India, the most effective step seems to be to bring the uncultivated lands under plough, wherever economically feasible and use this land for food production. The market for coastal development is limited to rebuilding the coast after storms and cyclones. Land reclamation is still a too expensive way of creating land for Indian standards.

Water & Vegetation

Water productivity and food production ●●●

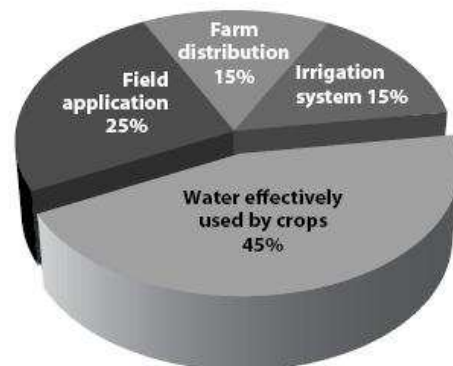
The availability of water varies tremendously by region, and in some areas it is very scarce. Nevertheless, even with limited water supplies, irrigation can vastly increase agricultural productivity and is crucial to improving food security. Underused water resources in parts of India offer great potential for irrigation, especially using simple and inexpensive technologies. However, irrigation must be managed carefully to avoid environmental damage, which is already extensive, and the spread of water-borne diseases. In this field of managing the irrigation process, opportunities are open for small- and medium sized companies who can provide them with the knowledge and experience.

Without investment in irrigation, it will be difficult to increase food production, reduce the financial burden of agricultural imports and increase food security. The lack of investment in irrigation contributes to the expansion of agriculture on to marginal lands with an uncertain rainfall. This is forcing millions of impoverished people to farm in ecologically fragile areas. Without adequate water, farmers have little incentive to invest in quality seed and inputs. The large-scale irrigation schemes of the past have lost favour because of their social, environmental and financial costs. Now, project planners are seeking the participation of farmers in designing and managing irrigation plans.

- Irrigation increases yields of most crops by 100 to 400 percent. Over the next 30 years, 70 percent of gains in cereal production are expected to come from irrigated land.
- Worldwide, agriculture uses 70 percent of all water, while in many developing countries the figure is as high as 85 to 95 percent.

Alternative water sources ●●●

In many regions, water is being pumped out of the ground faster than it can be replenished. In India's Tamil Nadu state, overpumping has lowered the water-level in wells by 25 to 30 m in a decade. Much harvested water is wasted (*see pie chart*), lost through canal leakage, spillage, seepage and evaporation – although some “lost” water reaches rivers or underground aquifers. Unless irrigated



fields are drained properly, salt builds up in the soil as water evaporates, reducing the productivity of the land and eventually making it infertile. Therefore new alternative water sources must be used. Filtering brackish water, recycling wastewater and desalination plants are alternatives for the use of groundwater for irrigation.

An example

A recent study of the irrigation project at the Narmada River shows the way. Dams, wells and canals built in the village's increased agricultural productivity and generated income that allowed people to cope better with "hungry periods" of the year. The projects included non-agricultural activities such as nutrition education. The benefits extended beyond increased agricultural productivity, giving women time to start market gardens and helping families reduce debt, increase school attendance, limit seasonal migration for work and earn cash to pay for health care.

Now, water facilities to 8215 villages and 135 urban centres in Gujarat both within and outside command. These include 5825 villages and 100 urban centres of Saurashtra and Kachchh which are outside the command. In addition, 881 villages affected due to high contents of fluoride will get potable water. Next to the water supply, the Narmada River provides community with power (actual power generation: 1450 megawatts) and employment (600,000 man-years) in post construction. (http://en.wikipedia.org/wiki/Narmada_Dam_Project)

Agriculture and poverty

Increased agricultural productivity is a key to reducing poverty in India. Because irrigation raises yields, it is essential to increasing productivity. Farmers benefit from irrigation directly through increased and more stable incomes and the higher value of irrigated land. Communities benefit through better wages, lower food prices, a more varied diet and the health benefits of greater water availability. Studies in India and Bangladesh have shown that every job created in irrigated agriculture yields another job in agricultural services and the processing industry. While large-scale irrigation schemes play an important role in improving food security, benefiting farmers who have more land, many low-cost small-scale techniques can be used by poorer farmers to increase yields. This field of expertise is present in many Dutch NGOs.

Drinking Water & Industrial Water Supply

Decentralized (point of use) household level •••

Drinking water problems in India are quite different from those in the developed countries. The main concern is with disinfecting the potable water at the point of use. Traditionally, the point of use market has been dominated by ultraviolet purifiers and filters. One company Eureka Forbes holds with their UV purifiers over 50% of the total domestic purifier market, based on their excellent direct marketing and service network. Industrial majors like Ion Exchange and Thermax have tried to enter this market, but only with limited success. In the last two, three years, domestic reverse osmosis purifiers have struck the market and have been highly successful. The common perception is that UV purifiers are not able to purify water satisfactorily, because they do not get rid of the impurities as compared to membrane technology based purifiers.

The big operators in the domestic water segment are market leader Eureka Forbes, a joint venture between Forbes Gokak and Electrolux AB of Sweden, Ion Exchange, Permionics India, Softel Machines and Sintex Industries. There are also a number of local and regional players in the unorganised sector. As much as 75% of the market is accounted for by Eureka Forbes with its brand Aqua Guard. The rest of the players are fighting for the remaining 25% of the market. The differentiating factor among various brands is the kind of technology being used. Up to now, the ultra-violet or the UV technology, used by companies like Eureka, Sintex has been the dominant technology. However ultra-filtration, membrane technology and reverse osmosis are now being used increasingly. There are lot of major players in the reverse osmosis technology like Usha Brita, Bajaj, Maharaja and regional players like Kent, who have become competitors of players in UV technology. However, UV still holds a major hold due to its price. The UV purifiers (AquaGuard) are normally in the range of 130 – 200 Euros compared to the reverse osmosis purifiers for 300 – 400 Euros.

Non-piped / decentralized municipal supply ••

- Municipal authorities, public health departments
- Commercial establishments – hotels, hospitals, housing complexes etc.

The water requirement of such major water consuming industries mentioned above has grown from 100 million litres a day in 1950 to 5000 million litres a day in 2002. Consequently the waste water generation has grown from 70 million litres a day in 1950 to 4000 million per day in 2002.

Optimising the process chain • • •

Industrial companies located in urban areas are one of the greatest causes of water pollution. They also are large consumers of drinking water, as it is used in their processes. Because these companies use such a quantity of water, they turned to tapping of groundwater. As already stated, this contributes to the lowering level of groundwater. Although knowing that this is not a sustainable way, companies nowadays have enough money to buy water from private suppliers once their wells to groundwater have gone dry.

In the industry, water scarcity is growing. This, coupled with the rising costs of water for industrial use, supports the recycling market in India. Industry has been motivated to adopt zero discharge technology. Although this transition is currently limited to large en medium sized companies, it is a definite indicator of the type of business opportunities that are to emerge in the short/medium term.

The industry is highly fragmented and unorganised in nature. It can be split into three categories.

- Large players like VA Tech Wabag, Ondeo Degremont, Hindustan Dorr-Oliver, Paramount, Ion Exchange, Thermax
- Medium Sized Players like Doshi Ion Exchange, Aquatech, Fontus Water, Team Ions Hydro
- Small players over 500 in number

The market has undergone a tremendous change in the last few years. Ion Exchange India Ltd. can claim credit for pioneering the water treatment industry in India. It is the only one of the companies which offers total water management solutions, and the only company to offer the complete range of water treatment processes and solutions for treating any kind of water from canteen water to water for production use. They were followed by another company Thermax which also grew the market. These two companies nearly occupied 50% of the market. Today, there are lots of medium sized companies who have increased their operations.

In the last few years, many international majors have also entered the market. While huge players like Vivendi (now Veolia Water), Degremont and VA Tech Wabag are present in the market, chemical majors like Nalco and GE Betz Dearborn also have operations. Indigenous development of various treatment vessels like resins, RO membranes and vessels have reduced costs and made technologies easily available on a mass scale.

Some of the international companies with a significant presence in India are:

- Veolia Water, France
- Degremont, France
- Va Tech Wabag, Austria
- Nalco Chemicals, USA
- Pentair Group, USA
- Dewtreat Chemicals, USA

The processes like reverse osmosis, and ultra-filtration are dominated by a few players since they are high technology products. Both the large and the small scale players are operational in water treatment chemicals.

Management contracts for plants • •

It is expected that in the future all process industries will have water recycling plants. Coastal industries may adopt seawater desalination plants either using process waste heat or reverse osmosis membranes. Domestic requirements would be met by natural resources, while industrial requirements may have to be supplemented by desalination.

India has a reasonably well-established, and cost-competitive, water treatment equipment industry. It is estimated that equipment made locally, is about 30 percent cheaper than imported equivalents due to high import duties. The share of indigenous goods in this sector is almost 90%. However, in design/technology of water treatment plants Indian firms have limited capabilities. Therefore, a distinct opportunity exists for foreign companies to offer technical consultancy services through the contractual and/or joint venture route.

Water quality • •

The water that comes from the tap in India is not potable. Everybody who can afford a filter buys one. As already mentioned this market might however prove difficult to penetrate because it is already firmly in the hand of the French, Americans and Swedish.

Mains •

The market for the import of Dutch mains is challenging in India. Because the Indian market is such a mass market, they have enough rough materials to build their own mains. The only opportunity lies in the combination with metering equipment. In the next 5 years, 300 million houses will be built which creates a enormous potential for mains and meters.

Wastewater

General information

India's water and waste water sector reflects a significant level of technological capability and development. It is becoming more sophisticated each year. The sector is quite competitive and is dominated by joint-venture arrangements that feature Indian firms partnering with foreign firms. There are about 210 and 240 successful foreign collaborations in India's water and waste water treatment sector. Because of resource and space constraints small and medium sized industrial facilities in India face, packaged treatment units for isolated businesses and common effluent treatment plants for clusters continue to be promising business opportunities.

Growing water scarcity and water pollution are the most severe and well recognized problems in India. The reuse of wastewater has become an absolute necessity and the waste water sector is estimated to be \$ 1,24 billion. There is an urgent need to develop innovative, more effective and inexpensive techniques for treatment of wastewater. A wide range of wastewater treatment techniques are known which includes biological processes for nitrification, denitrification and phosphorous removal; as well as a range of physico-chemical processes that require chemical addition. The commonly used physico-chemical treatment processes are filtration, airstripping, ion-exchange, chemical precipitation, chemical oxidation, carbon adsorption, ultrafiltration, reverse osmosis, electro dialysis, volatilization and gas stripping. A host of very promising techniques based on electrochemical technology are being developed but are not yet to the commercial stage. Almost all of these system use vast amount of energy in order to produce results and consequentially are expensive to not only build but to operate and when you consider the rising costs of energy today you will see the opportunities for technologies that can produce enough electricity as a by product to run itself.

Sensing, monitoring and control • • •

The market for these specialized technological innovations is based on project basis. Since the Indian states are investing more and more in the reuse of wastewater, an analysis of the waste water flows is critical.

As already mentioned in 'urban water management', leakages are one of the biggest problems in urban areas. Metering water usage is fairly uncommon and the market is open for it. Our modern technologies create possibilities to exploit the big opportunities in this sub sector.

Industrial recycling of process water • • •

The industry is experiencing growing water scarcity. This, coupled with the rising cost of water for industrial use, supports the recycling market in India. Industry (especially large and medium scale units) has been motivated to adopt zero discharge technology. Although this transition is currently limited to selected large and medium scale units, it is a definite indicator of the type of business opportunities that are to emerge in the short to medium term.

In the medium to long term scenario, all industrial estate locations, where common effluent treatment plants are going to be constructed, should offer business opportunities in the recycling segment. In general business to business is considered to be easier than business to government.

Recycling of wastewater • • •

Urban

Lack of maintenance in water supply and sanitation has led to the contamination of ground water sources in most of the cities and towns. The main source of this contamination of groundwater is due to improper discharge of sewage. More than half of the cities have no sewage treatment and disposal of solid wastes. A lot of opportunities are there for companies who are experienced in sewage treatment. The demand for waste water treatment sector systems is increased by the Water Prevention and Control of Pollution Act of 1974 and the Environmental Protection Act of 1986. (www.elaw.org). Prescribed discharge standards are there for wastewater treatment systems which provide great business opportunities in this sector.

Rural

Wastewater has high potential for reuse in agriculture, an opportunity for increasing food and environmental security by avoiding direct pollution of rivers and surface water; conserving significant proportion of river basin waters, and disposing of municipal wastewater in a low-cost, sanitary way. However, wastewater for irrigation poses a number of health and environmental risks at various levels. Though wastewater use in agriculture is an age-old practice, there is lack of systematic information on the subject, particularly on issues such as farmer's needs and preferences and health and environmental risks.

Carbon-nitrogen cycle •

This Indian market is still on a hold.

Outsourcing

It is clear that for outsourcing services India is the place to be at the moment. China is still the 'factory of the world' and that forces India to focus fully on any kind of service. Call-centres, after sales services and knowledge work are more and more outsourced to cities like Bangalore, Chennai, Pune and Hyderabad. Especially in the service- and IT-sector more and more work is carried out in India, mainly due to the low wages.

The most interesting way to make use of the economies of scale of India is by outsourcing your **service** activities. New water technologies that are designed in the Netherlands can also be assembled in India. Good contacts with local Indian suppliers is then required.

Regional focus

The Indian states now have the responsibility to increase their activities in the economic field themselves. Some states are very eager to quickly invest heavily in business. These economic driven states are mainly located in West-, Northwest and South-India. States like Haryana, Gujarat and Maharashtra have put a lot of effort in to attract international companies to invest in their state. Maharashtra, especially the areas surrounding Mumbai, has grown into an industrial and business centre in the last decades. The same happens with Gujarat and Karnataka where the areas surrounding Bangalore are called the Indian Silicon Valley. Other areas like Andhra Pradesh, Tamilnadu and Rajasthan are also interesting. These state governments are becoming more proactive in the water sector and expect international involvement avidly.

Financial and Non-financial services

In the beginning of March 2003, the Indian government took the unilateral decision to stop receiving financial assistance from a number of small donor countries. And thus bilateral development cooperation (ontwikkelingssamenwerking) with several donor countries including the Netherlands ended. As of then the Indian Government only wanted to sustain a developmental relationships with large nations that are part of the G8 and with the EU. By 2005 all the major components of the bilateral relationship as for development cooperation where phased out. Good Dutch relations with the World Bank and Asian Development Bank are therefore important.

Below several Financial and Non Financial instruments are listed that can support Dutch Organisations that want to enter the water market in India.

Financial instruments

DUTCH GOVERNMENT

Orientation, cooperation, pilot projects and investment;

- 2g@there; www.evd.nl
- Partners voor Water (focus on the water sector); www.partnersvoorwater.nl
- CPA (Collectieve Promotie Activiteiten); www.evd.nl
- PSB (Programme Starters on foreign markets); www.evd.nl
- PESP (Programme for economic cooperation in projects); www.evd.nl
- PSOM (Programme for cooperation with emerging markets); www.evd.nl
- ISOM (Programme for technological cooperation); www.evd.nl
- PUM (Programme Expad Managers); www.evd.nl
- PPP (Promotie Projecten van Posten); www.evd.nl
- *Transactions;*
 - IFOM (Financing by granting credit for emerging markets); www.fmo.nl
- *Insurance;*
 - EKV (Export Krediet Verzekering); www.evd.nl

INDIAN GOVERNMENT

- The Export Promotion Capital Goods Scheme says that **dispensation or deduction of the import duty on investment goods** is possible if these goods are of added value.
- The Duty Exemption Scheme gives **dispensation or deduction of the import duty on building materials, semi finished products, parts and packaging materials** that are being used by the manufacturing of finished goods.
- Dispensation for import duty or duties is there for companies that have the status of *Export Oriented Unit* or companies set up in *Special Economic Zones*.

INTERNATIONAL INSTITUTES

- **Worldbank**; with the India strategy they have an annual budget of \$ 3 billion available for projects to fight poverty.
- **Asian Development Bank**; granting of credit and donations for projects in agriculture, environment and infrastructure with a focus on the lesser developed states in the north-eastern states.
- **ALA-Fund**, EU-programme for developing countries in Asia with the goal of reducing poverty.
- **Asia Invest**; promotion of contacts and joint ventures between mid-sized companies in Europe and Asia.
- **European Investment Bank**; funding for investments made in India with the emphasis on protecting and improve the environment with a mutual advantage for the European county.

Non-Financial instruments

- The NWP, The Netherlands Water Partnership (NWP) is an independent body set up by the Dutch private and public sectors. They nationally coordinate water activities overseas and provide relevant information regarding these activities. The main goals of the NWP are to harmonize the activities and initiatives of the Dutch water sector overseas and promote the Dutch water expertise worldwide. The organisation acts as focal point in the exchange of information among the more than 150 Dutch members.
- The EVD (Agency for International Business and Cooperation) provides services like answering individual questions, information services, market exploration, publications, the annual 'Spreekdagen' and several Seminars.

- Services from the **Governmental network**; the Embassy in New Delhi, CG in Mumbai, and the NBSO's in Ahmedabad and Chennai who offer general market information and help with contacting the Indian Government and companies. Missions to India are also supported by these institutes.
- The EVD and the Governmental network provide individual market scans. Answering your specific questions about the market, contacts, risks and barriers.

Challenges and Advise

> *Pre-investment Phase*

Market analysis

- Consider the large amount of secondary data available in India before commissioning primary research; you may find that you do not need a very accurate estimate, given the vastness of the Indian market.
- Indian markets are very price- sensitive, conservative, and operate under peer group psychology. Drastic changes in consumers' spending patterns take time.
- Adopt a regional focus while having a national agenda.
- Do not ignore the rural markets.
- Speak and listen to compatriots operating in India.
- Be aware of the institutional complexity and bureaucracy.

Contracts

- Signatures have limited weight and most agreements are renegotiable. This is especially so in view of the slow legal enforcement process. Financial commitment of the partner is the surest confirmation.
- Understand the full implications of taxation on lump sum, royalties, etc and also term like 'net' and 'gross' payments.
- Enforce oral understandings in writing; do not leave anything uncovered- even in confidential agreements.
- Always have an exit clause in your partnerships.

> *Investment Phase*

Location aspects

- Understand the zoning and environmental aspects applying to the location.
- Check out property titles, and preferably buy land directly from the Government.
- Understand tax and other incentives available in various locations.
- Check out availability of resources logistics, and transportation, besides social amenities and living conditions before finalising your business location.

Management/personnel

- Technical knowledge of the Indian officials is high! Water problems are being seen as technical problems and thus are seen to be solvable.
- Determine the actual need for posting expatriates at various levels, especially as a Director.
- Understand all local employment terms, income levels and social costs, before finalising an HR policy.
- Outsource as much work as possible.
- Avoid locations known to harbour militant trade unionism.

Running the business

- Deal with each circumstance on its own terms: generalization is difficult in India, and it is important to assess specific issues and find specific solutions for each case.
- Social customs differ among states, and local adaptation is required in business policies and practices
- Do not be led by expedient solutions! Follow all provisions of the Factories Act, Industries Regulation Act, Labour Act and others applying to your business.
- Have a good liaison agent and outsource all government related issues - it can save you time and unnecessary problems

Conclusions

- Water is a key area of the Dutch economy. India is considered to be a high priority country. Quite a lot of Dutch organizations are already active in India.
- India is growing economically as well as in self-confidence. This is mostly concentrated in and around the large cities such as Delhi, Mumbai, Bangalore, Hyderabad and Chennai that can act as 'business hubs'
- The Vision 2020 and the upcoming common wealth games in 2010 will result in a lot of attention on the challenges in the water sector in India the coming years. It will result in major investments.
- In this market-scan several sub-sectors in which the Netherlands has extensive and unique knowledge have been identified that are very promising:
 - o Water management
 - Sea soil and groundwater (level / contamination)
 - Urban Water management
 - o Water and Vegetation
 - Water productivity for food production
 - Water distribution and quality
 - o Drinking water and Industrial water supply
 - Decentralized (point of use) household level
 - Water for Industrial processes
 - o Waste Water
 - Sensoring, monitoring & control
 - Industrial water recycling
 - Recycling of waste water (household level)
- India is keen to shed its image as an aid-needing country, and takes concrete steps to reduce ties with donors. All in all, it is unlikely that India will ever again recover to have a large donor-supported consultancy market (discontinuation of DGIS aid). Exceptions are the large development banks, which it needs especially for large investments in infrastructure.
- The main challenges for Dutch organizations that are active in India are the institutional complexity, bureaucracy, competitors and the gap between the niche market (capital intensive) and the Indian mass market (low cost). Dutch technology can be used to create new, adapted products for the Indian market.

- Consider adapting a national agenda, while having a regional focus. In general the following regions are interesting (high profile / spin-off): Haryana, Maharashtra, Karnataka and the cities Delhi, Mumbai, Chennai and Bangalore.
- Consider outsourcing of services, since it can create additional benefits.
- Invest in building relations and take your time.

Recommendations for NWP

- Organize an event for Dutch organizations interested in India to discuss these results and the way forward.
- Develop a strategy to strengthen the position of the Dutch water sector in India by uniting forces.
- Consider a NWP (network) representative in India to support and expand on existing structures and activities.
- Consider ways in which to enhance the 'visibility' of the Dutch water sector in India.
- Consider means to actively facilitate partnerships between organizations in the Netherlands and India.
- Consider ways in which to improve information exchange related to the water market in India
- Support organizations in applying for non-financial and financial instruments.
- Make information about the Indian water sector transparent for Dutch organizations.

Further research / actions

- Deepen market information on promising sub-sectors in interesting regions that have been identified in this market-scan.
- Develop a sector-wide strategy to strengthen the position of the Dutch water sector in India

Practical information

- **India Vision 2020: A vision for the New Millennium** by APJ Abdul Kalam with YS Rajan
- **Springs of Life: India's water resources** by G. Pangare, V. Pangare & B. Das
- **Beleidsnotitie India** by Ministry of Foreign Affairs of the Netherlands (BuZa)
- **India's water economy; Bracing for a turbulent future** by J. Brisoë and RPS. Malik

www.nwp.nl

www.waterland.net

www.evd.nl

www.partnersvoorwater.nl

www.waterraid.org

www.watercan.com

www.water.org

www.ethosinternational.org

www.un.org/millenniumgoals

www.ficci.com

www.teriin.org

www.eco-web.com

www.elaw.org/resources/text.asp?id=1912 (Water Prevention and Control of Pollution Act of 1974)

www.elaw.org/resources/text.asp?id=1911 (Environmental Protection Act of 1986)

www.evd.nl/india

www.mottmac.in

APPENDIX 1

Organisations Under the Ministry of Water Resources

- *CENTRAL WATER COMMISSION, NEW DELHI (cwc.gov.in)*
- *CENTRAL GROUND WATER BOARD, FARIDABAD (cgwb.gov.in)*
- *CENTRAL SOIL AND MATERIALS RESEARCH STATION, NEW DELHI (cwprs.gov.in)*
- *NATIONAL WATER DEVELOPMENT AGENCY, NEW DELHI (nwda.gov.in)*
- *NATIONAL INSTITUTE OF HYDROLOGY, ROORKEE (www.nih.ernet.in)*
- *WATER AND POWER CONSULTANCY SERVICES (INDIA) LTD., NEW DELHI*
- *CENTRAL WATER AND POWER RESEARCH STATION, PUNE (cwprs.gov.in)*
- *NATIONAL PROJECTS CONSTRUCTION CORPORATION, LTD., NEW DELHI (www.npccindia.com)*
- *GANGA FLOOD CONTROL COMMISSION, PATNA*
- *NARMADA CONTROL AUTHORITY, INDORE (www.ncaindia.org)*
- *SARDAR SAROVAR CONSTRUCTION ADVISORY COMMITTEE, VADODARA (www.sscac.gov.in)*
- *FARAKKA BARRAGE PROJECT, FARAKKA*
- *BETWA RIVER BOARD, JHANSI*
- *BANSAGAR CONTROL BOARD, REWA, MADHYA PRADESH*
- *BRAHMAPUTRA BOARD, GUWAHATI*
- *TUNGABHADRA BOARD, BELLARY*
- *UPPER YAMUNA RIVER BOARD (UYRB) (uyrb.nic.in)*

Other Ministries involved in water issues

- *MINISTRY OF AGRICULTURE (agricoop.nic.in)*
- *MINISTRY OF POWER (powermin.nic.in)*
- *MINISTRY OF ENVIRONMENT & FOREST (envfor.nic.in)*
- *MINISTRY OF RURAL DEVELOPMENT (*
- *MINISTRY OF INDUSTRY*
- *MINISTRY OF URBAN DEVELOPMENT*

APPENDIX 2

Overview of contacts

Ministry of Water Resources	Mr. Srivastava
Confederation of Indian Industry (CII)	Mr. Arun Nanda
Indian National Committee on Irrigation and Drainage	Mr. Koche
All India Institute for Local Self-Government	Dr. Sneha Palnitkar
Foundation for Critical Choices for India	Mr. Jambagi / Niranjan Khatri
Central Water Commission	Mr. Eskedas
Teri Research Institute	Mr. Pretik Dhosh
Planning Commission, Environmental Issues	Mr. Srikanta Panigrahi
Royal Netherlands Embassy	Mr. Theo Groothuizen / Maya Acharya
Royal Netherlands Consulate	Ms. Divya Das
DHV India	Mr. Mahmood Ahmad
DHV NL	Mr. Ravi Patandin
Norit	Mr. George Varkey
Ion Exchange India	Mr. Rajesh Sharma
Philips India	Mr. K. Ramachandran
Technochem Group	Mr. Sriram Kulkarni
SMEC	Ms. Ritu
Enhanced Wapp Systems	Mr. Rajesh Jain
Chemtronics Technologies	Mr. Shah
Everything about Water	Mr. Subramaniam
Shah Technical Consultants	Mr. Gautam Shah
Wash, Indo-German Project	Mr. Guenter Rudolf
Supreme Court Advocate	Mr. NDB Raju / Atul Chitale / Mr. B. Nath
Jadavpur University, School of Environmental Studies	Dr. Dipankar Chakraborti
Naandi, Safe Water Program NGO	Mr. Pavin Pankajan

APPENDIX 3



