5.2 Assistance Policies

(1) Country Assistance Programme and Environmental Assistance

The work to formulate the country assistance programme for Pakistan by the Ministry of Foreign Affairs for the present fiscal year is being led by the Country Study Group of the JICA and the draft report was prepared by the Field Task Force in September, 2003 (in Japanese).

This Study Group has set "the establishment and development of a sustainable society" as the higher goal for Japan's development assistance for Pakistan and has proposed "human development", "economic development" and "local development" as the key approaches to achieve the said goal. The Study Group has also identified seven priority fields for assistance: ① health, ② education, ③ water, ④ development of economic infrastructure and the economy, ⑤ governance and economic reform, ⑥ agriculture and ⑦ the environment. In the field of the environment, "understanding of the reality of environmental pollution" and "improvement of the management capacity of the environmental administration" are considered to be key tasks. "Greenhouse gas control", "an environmental monitoring development programme" and "solid waste treatment" are identified as desirable subjects for future Japanese cooperation.

In its Environmental Conservation Initiative for Sustainable Development (EcoISD) issued in August, 2002, the Government of Japan states that "the active incorporation of environmental conservation elements" is one of the basic policies for environmental cooperation. This move reflects the need to consider linkage with environmental improvement in all priority fields to enable the provision of integrated assistance for the environment and development. The EcoISD states that "efforts will be made to improve environmental problems by incorporating environmental conservation elements in all development plans, projects and programmes to integrate poverty reduction and environmental conservation and also by assisting approaches which provide appropriate care for the environment". From this point of view, the desirable approaches to environmental problems are described from among the recommended cooperation for each field listed in the draft report mentioned above.

1) Health

As an infectious disease control measure, it is obvious that improvement of the drinking water quality will greatly contribute to preventing water-borne diseases, making it important for local residents to properly understand the present situation of the water environment for not only drinking water but also water used for daily life. Assistance to improve awareness of the environment and hygiene among local residents is, therefore, desirable.

2) Governance

While a programme to assist decentralisation is scheduled, strengthening of the function to coordinate the administration at the district and lower levels responsible for providing daily public services and the provincial government responsible for providing the development budget for equipment renewal and the acquisition of disposal sites, etc. and for operating the Social Action Programme (SAP) is required for the smooth progress of solid waste management led by the local administration.

3) Water

The rehabilitation of irrigation facilities and the strengthening of water management to improve the efficiency of water utilisation can greatly contribute to mitigating the damage caused by water-logging and salinization. To achieve the desirable effects, it is essential that local residents and other stakeholders understand that the improvement of the environment by a project is advantageous for production. The provision of incentives for producers to properly maintain irrigation facilities is also necessary to make such maintenance work the basic approach to achieving sustainable agricultural production.

Improvement of the water supply and sewerage facilities will certainly improve both the water supply rate and hygiene conditions. Measures to ensure "the supply of clean water" should be examined by clarifying the situation of such factors for water quality deterioration as the contamination of water sources and the intrusion of waste water from the sewerage system to water supply lines because of the deterioration or improper pipe arrangement of the existing water distribution network. As in the case of solid waste collection, the water supply and sewerage services are operated and maintained at the district level. Accordingly, the issues of improvement of the administrative capacity at the district level and an appropriate tariff system should also be examined with a view to establishing a sustainable, comprehensive water supply and sewerage system.

4) Economic Development and Economic Infrastructure

The implementation of measures designed to promote small and medium size enterprises should be accompanied by a change of attitude on the part of these enterprises to the environment as many of them are sources or air or water pollution. The matters to be considered in connection with assistance for environmental improvement are not only "measures at the outlets", including the observation of emission standards through the introduction of a self-monitoring system, etc., but also the "spread of cleaner production" and others. To be more precise, stimulation of the demand for environmental technologies involving the market mechanism and the development of the environmental industry through the establishment of suitable conditions for investment are desirable so

that reduction of the polluting environmental load in production processes can coexist with increased profits for enterprises.

The implementation of EIA without fail is desirable as part of the development of social infrastructure, including transportation-related infrastructure. Although the guidelines for IEE/EIA are in place, insufficient experience on the part of government organizations cannot be denied. EIA should, therefore, be conducted with the initiative of donors.

5) Agriculture, Forestry and Fisheries

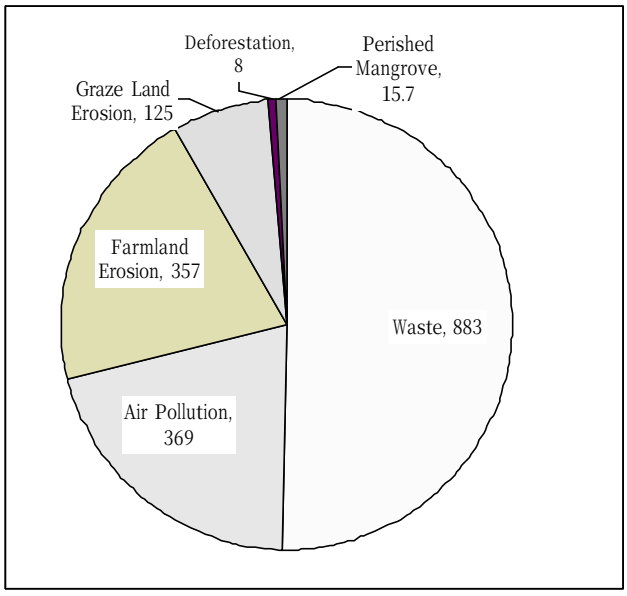
One crucial issue for assistance to establish sustainable agriculture in the face of a natural environment which is vulnerable to the adverse impacts of drought, etc. is harmonisation of the preservation of livelihoods for poverty reduction with the sustainable management of natural resources. Farmers who are the main actors are mostly poor and lack the opportunity to learn knowledge and skills relating to environmental conservation. As the ecosystem reflects the particular character of a local area and may involve knowledge and information exclusive to local residents, the incorporation of both the participatory learning of local residents and the provision of environmental education for local residents in any plan/programme to assist development is important.

(2) Examination of Possible Assistance Policies for the Environment Sector

As discussed so far, environmental cooperation is the provision of assistance for the self-help efforts of developing countries in diverse fields. Here, assistance policies which primarily aim at achieving environmental conservation are examined.

In the 1990's, the World Bank tried to estimate the environmental damage in Pakistan in the form of compensation for health damage and the loss of human resources and work hours and produced a total figure of US$ 1.8 billion/year. As shown on the graph, approximately half of the damage (51%) is caused by solid as well as liquid waste from urban areas which far exceeds urban air pollution (21%) and farmland erosion (20%). Waste and air pollution are, therefore, the two main environmental problems of

Cost of Environmental Damage (US$ million/year)



urban life and the need for external assistance to solve these problems can be described as being stronger than other fields given the fiscal difficulties and insufficient capacity of provincial governments.

The following points can be made in reference to the desirable approach for assistance to solve environmental problems in Pakistan based on the field survey results.

1) Environmental Monitoring Development Project

An environmental monitoring development project has already been included in the list of desirable assistance in the Draft Report of the Country Assistance Study Group of the JICA. Assistance for this field is very important as the need for such assistance is illustrated by the core status of clean air and clean water in the NEAP. In Pakistan, no continuous observation data on the air and water quality at fixed points has so far been available. The accumulation of such data for major cities in the future should prove to be a powerful tool for the planning of effective as well as economical environmental measures.

The Pak-EPA and provincial EPAs which will be the implementing bodies of this project are not the only research organizations for environmental monitoring as some organizations of the Ministry of Science and Technology and the Ministry of Health possess suitable equipment for the planned monitoring. The clear setting out of the roles and responsible field for each organization is, therefore, desirable and the project is designed to ensure the mutually complementary nature of these organizations.

One serious problem relating to the measuring and analysis of the air and water quality is the shortage of staff members with practical experience. Any technical cooperation programme should take collaboration with human development efforts, particularly training designed to enhance the quality as well as quantity of engineers/technicians conducting measuring and test, into careful consideration.

2) Solid Waste Management Project

A request for the provision of Japanese assistance has already been made for the Final Disposal Station Construction Project in the capital of Islamabad. Solid waste management is one of the core issues of the NEAP and the need for solid waste management in Pakistan is extremely high.

The responsibility for solid waste management lies with local governments and routine solid waste management at the district level in particular poses a major task. In the midst of the ongoing decentralisation drive, however, the necessity to develop a legal framework at the federal level can be pointed out. While there is a NEAP-SP project to clarify the responsibility of the administration and to prepare unified guidelines for solid waste management at the federal level, this project has not yet reached the implementation stage. As solid waste is composed of complex elements which change in response to socioeconomic changes, a legal system should be developed to ensure the consistency of the basic definition of solid waste and the management responsibility for solid waste from a legal point of view.

The Government of Japan has provided ODA for mainly the procurement of collection and landfill equipment for solid waste management and the local expectations for Japan's continued assistance for solid waste management are quite high. Given the current emphasis on decentralisation, future Japanese assistance to enable the sustainable administration of solid waste management must take the following points into particular consideration.

① Secured provincial government funding to cover the equipment maintenance and renewal cost (particularly as long-distance transportation is planned)

② Availability of suitable sites for final disposal stations under a long-term plan

③ Improved awareness of environmental issues through the participation of local residents and the autonomous management of organizations by local residents

④ Clarification of the responsibility and scope of authority of the administration, private sector and local residents for solid waste management

⑤ Examination of a suitable recycling and resources collection system for each local area based on a clear understanding of the socioeconomic characteristics of the area

⑥ Confirmation of the availability of a system to properly handle and manage hazardous solid waste (a system to be incorporated in a project if necessary)

3) Water Environment Model Approach

① Current Situation of Water Environment Problems and Direction of Assistance

Since deterioration of the urban environment is frequently caused by multiple factors, it is possible to select appropriate countermeasures by ascertaining the degree of impact of each cause. For example, taking the case of Peshawar, it is thought that pollution of city rivers and other water bodies contaminates private wells, which take water from shallow wells, and eventually also has an impact on public water supply, which takes water from deep wells.

So far the actual state of water pollution in city rivers has not been ascertained by a uniform method in terms of the local water circulation system. Accordingly, although various causes of pollution are considered, for example, untreated industrial and domestic waste water, leachate from solid waste dumping sites, and infiltration by insufficiently treated sewage, there is no way of identifying the degree of impact of each cause.

In addition to grasping the actual state of pollution by environmental monitoring, it is also considered important to examine priority measures for water quality improvement upon selecting model districts (in consideration of the water circulation) and implementing intensive investigation of water flow and corresponding changes in water quality from a variety of angles. By doing this, it is possible to formulate a plan of environmental measures suited to each area, while at the same time obtaining basic indicators of environmental impact that can be applied throughout the rest of the country.

Criteria for selecting the model area should be that the area in question is representative of urban environmental deterioration throughout the country and that the class of people living in poverty has a major impact in terms of the social environment.

In terms of population, the largest cities in Pakistan are Karachi, the capital of Sind Province with a population in excess of 10 million, and Lahore, the capital of Punjab Province with a population of more than 5 million. These two far outstrip the other major cities in Pakistan that have populations of 1,000,000 or more. These include the third largest city of Faisalabad (2,250,000), fourth-placed Rawalpindhi (2,600,000 combined with tenth-placed Islamabad), fifth-placed Gujranwala (1,900,000), sixth-placed Multan (1,340,000), all of which are located in Punjab Province, seventh-placed Hyderabad (1,300,000, Sind Province) and eighth-placed Peshawar (1,200,000, NWFP).

Since Punjab Province is the economic center of the country and attracts most of the foreign assistance including that from Japan, it is thought that spreading assistance to other provinces will be an effective means of promoting national development and reducing poverty. Moreover, in terms of human security, which is one of the Phylosophy of Japan's EcoISD, high priority is attached to assistance for North-West Frontier Province (NWFP) and

Balochistan Province, which currently hold many refugees from Afghanistan. In consideration of city size and level of development assistance priority as described above, Peshawar, the capital of NWFP, is confronted with urban environmental problems concerning both air and water. Moreover, in terms of both urban size and the social environment, this city is regarded as suitable for selection as a model district to implement assistance for urban environmental issues in Pakistan.

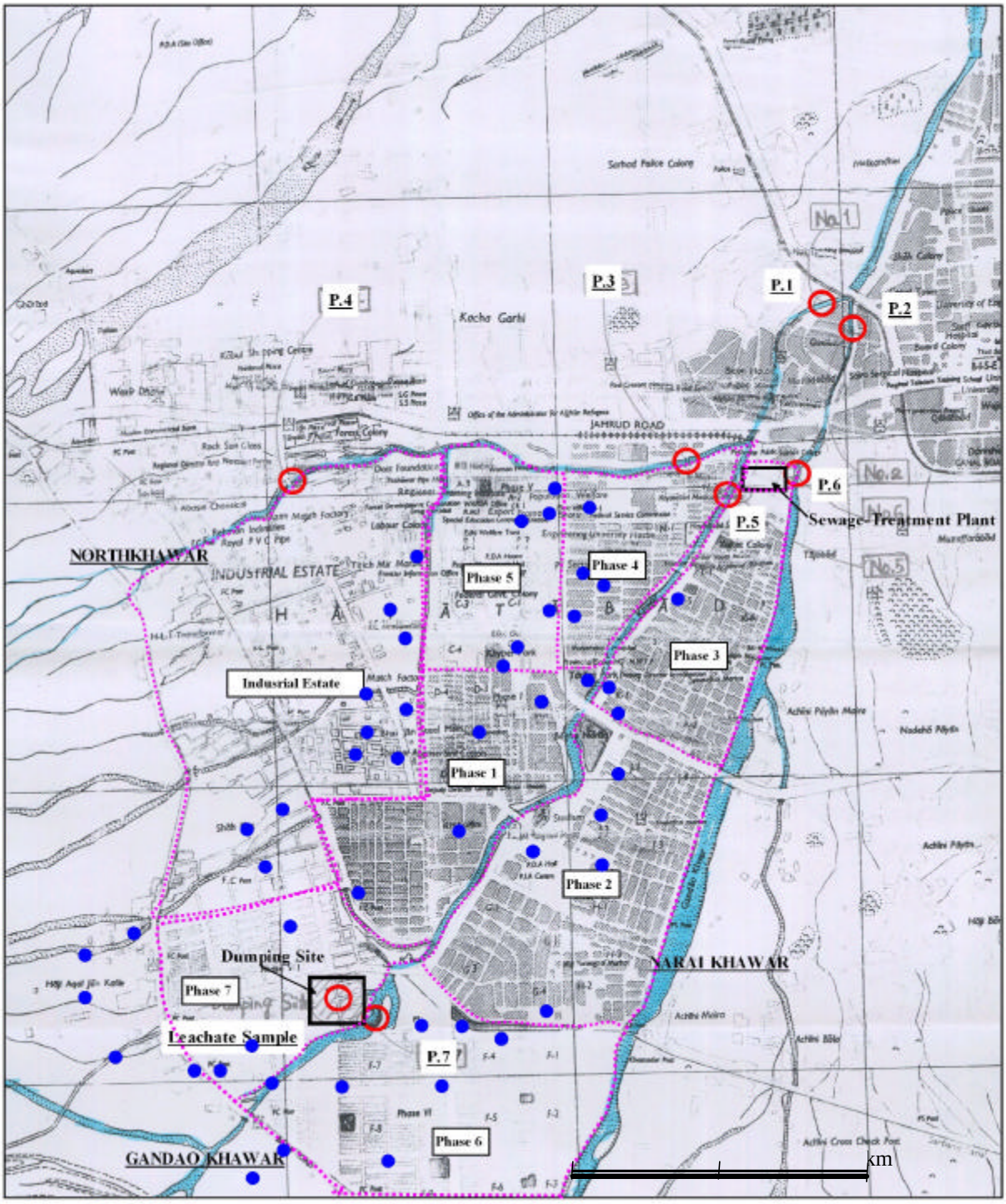
In consideration of the above, Peshawar was selected as the target city for site investigation in the Study, and survey of the water environment in the Hayatabad Town of the city was implemented in order to ascertain the water cycle, water supply, water pollution, main pollution sources and pollution loads and to examine the direction of future water environment improvement.

② Case Study in Hayatabad, Peshawar

With a view to gauging water environment issues in Hayatabad Town, the following surveys were implemented in cooperation with the Pakistan Environmental Protection Agency (Pak-EPA) and the North-West Frontier Province Environmental Protection Agency (NWFP-EPA). Table 7.2-1 shows the survey items, while Figure 7.2-1 indicates the survey area and survey points.

Table 7.2-1 Water Environment Survey Items in Hayatabad

Survey Item	Main Survey Contents
Existing materials survey	- Social environment data: Population, land use and plans, infrastructure development, facilities plans, etc. - Natural environment data Weather, water quality (rivers, groundwater), number of wells, etc.
Field survey	River water quality, groundwater quality, etc.



Legend	
P.1	Water quality survey points
	Tube well points
Phase.1	Hayatabad urban area

Figure 7.2-1 Sketch of Hayatabad Town and Map of Survey Points

The water cycle schematic and pollution load obtained from the survey findings are as indicated below.

Hayatabad Town consists of Phase 1~7 blocks, which are made up of residential areas and commercial land. An industrial estate is located on the west side of these. Since area and population data are not available for all blocks, the population of each block was computed from the estimated population in the Hayatabad residential districts and the area of each block.

Table 7.2-2 Estimated Residential Population in Each Block

Item \ Block No.	I	II	III	IV	V	VI	VII	Total
Area (ha)	197.4	241.3	113.3	125.1	142.8	309.8	205.4	1335.0
Estimated population (people)	14,787	18,071	8,487	9,367	10,698	23,202	15,388	Approx. 100,000

[Water source situation]

Peshawar is situated in a semi-arid zone with low annual rainfall. Rainfall during the Survey period was 68 mm/month in January 2004 and 486 mm/year in 2003. Compared with average rainfall over the past 10 years (average rainfall for January: 36 mm, annual average rainfall: 501 mm), these figures are more or less consistent with the average.

The main source of water in Hayatabad is groundwater, and there are 53 tube wells in total in blocks 1~7. As for the industrial estate, occupants procure their own water supply, but details concerning this are unknown.

[Drainage situation]

Looking at drainage conditions in Hayatabad, blocks 1~7 all have sewerage systems, however, because sewage treatment capacity is unable to keep up with the rapid increase in population, waste water from blocks 1~5 is actually discharged into Narai Kawar (River) after passing through a sewage treatment plant that isn't in operation. Moreover, waste water from blocks 6~7 is discharged untreated into Narai Kawar and Gandao Kawar. Industrial waste water from the industrial estate is discharged into North Nallar (River) without receiving hardly any treatment.

[Water pollution situation and calculation of load]

Table 7.2-3 shows the level of organic pollution (BOD concentration and its load) at each survey point and the town blocks considered to be the sources of pollution.

BOD concentration at the survey points excluding P2, 4 and 5 indicated in Figure 7.2-2 exceeds the 80 mg/litre waste water standard (inland water bodies) prescribed by NEQS, and the level at P1 was found to be 323.5 mg/litre, which is more than four times the said standard. As for COD, the NEQS standard (150 mg/litre) is exceeded at all points, and the peak value, again at P1, was 2,240 mg/litre or approximately 15 times the standard level. It is thought this

pollution is mainly caused by industrial waste water and untreated waste water from blocks 6~7.

In terms of heavy metals, lead and chrome levels exceed the standard at P1, P3, P4 and the dumping site. Judging from the state of the waste water, this pollution is thought to originate from industrial waste water.

Table 7.2-3 Organic Pollution Loads at River Water Quality Survey Points

River Water Quality Survey Point / Survey Item / Pollution Load	P1	P2	P3	P4	P5	P6	P7	Dumping Site Leachate	NEQS discharge standard for inland water
Flow rate (m3/sec)	0.22	0.24	0.1	0.007	0.002	0.36	0.07	-	
BOD_{5days} (mg/l)	323.5	75.5	224	51.5	47.5	150.5	88.25	805	80
COD (mg/l)	2240	606	1394	329.5	221	570	614	2840	150
BOD load (t/day)	6.15	1.56	1.93	0.03	0.01	4.68	0.53	-	
COD load (t/day)	42.58	12.57	12.04	0.2	0.04	17.73	3.71	-	
Lead (mg/l)	0.395	0.374	0.514	0.692	0.494	0.297	0.198	0.593	0.5
Chrome (mg/l)	1.62	0.83	1.21	0.82	0.4	0.79	0.75	2.82	1.0
Suspected pollution source	6,7,IE	1～7	IE	IE	6、7	1～5	Unknown	-	

(Note 1) Shaded areas indicate points in excess of the NEQS standard.

(Note 2) I. E. (Industrial Estate)

Moreover, per capita organic pollution load is computed as follows from the populations and pollution sources indicated in Tables 7.2-2 and 7.2-3. The daily per capita organic pollution load from Hayatabad residential district is reckoned to be between 58~76 g, which corresponds to roughly 1.5-2 times the average value of 40 g/day in Japan. The load value is influenced by river flow, however, since rainfall in the month prior to the survey was high at 68 mm/month, it is thought pollution load was on the low side at this time. Accordingly, in conditions of lower rainfall, when it is possible that river water dilution and biodegradation will not progress so much, the resulting water pollution will have an even worse effect on water use and fisheries resources. In particular, concerns are raised over the impact of population increase on river water supplies, odour and downstream river fisheries in future.

Table 7.2-4 Estimated Organic Pollution Load (per person per day, residential district)

	Population or number of plants	BOD load (t/day)	Unit BOD load (kg/day)	Load calculation method	Reference value
Phase 1 - 7	100,000	5.78	0.058	P1+P2-P3	0.04 kg/day
Phase 1 - 5	61,411	4.68	0.076	P6	
Industrial estate	24 factories	1.93	80.417	P3	-

(Note) Reference value: Daily per capita BOD load in Japan

[Groundwater pollution situation]

According to the Water Quality Status in Pakistan (Report 2001-2002) by the Pakistan Council of Research in Water Resources, Ministry Of Science & Technology (October 2002, surveys of well water have been implemented at 13 points in Peshawar, and these have shown that drinking water quality standards are exceeded only for coli-form group and sodium, whereas the standard for heavy metals (lead, chrome, etc.) is complied with.

Judging from these conditions, it is thought that contaminated waste water from factories does not have an impact on the aquifer that provides drinking water. This aquifer is situated at depth of 36~47 m lower than an impermeable layer.

Figure 7.2-3 illustrates in visual terms the water cycle and degree of organic pollution based on the above survey and analysis findings.

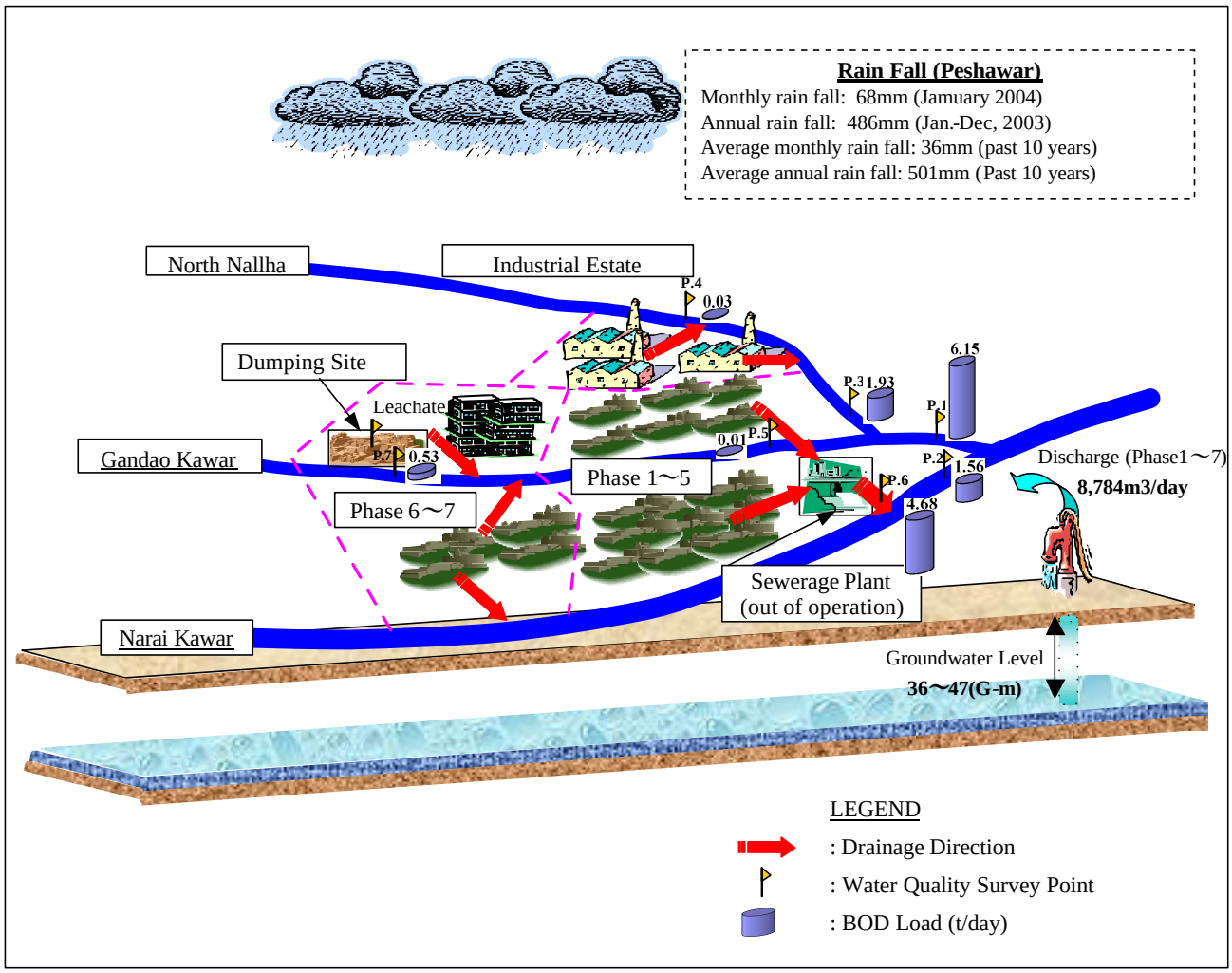


Figure 7.2-3 Schematic Water Cycle in Hayatabad

Judging from the water cycle and situation of pollution sources described above, the issues that need to be resolved in Hayatabad town, as well as the direction of countermeasures to such issues, are as follows.

Table 7.2-5 Current Issues and Direction of Countermeasures

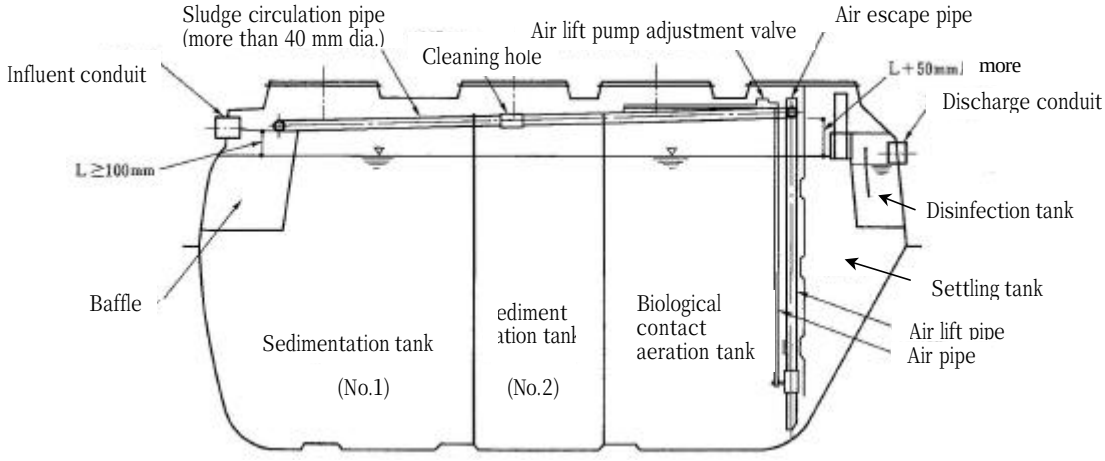
Pollution Source	Direction of Countermeasures
Industrial waste water	The NEQS (for industrial waste water standards) have been established, and NWFP-EPA is implementing the SMART Programme based on these standards. However, in reality, concentrations in excess of standards have been measured in rivers, indicating that it is difficult to realize improvement based on regulations alone. It is desirable to construct industrial waste water treatment facilities individually in each factory or communally in the industrial estate, while at the same time considering cost vs. effect.
Domestic waste water	A sewerage system and treatment facilities are planned, however, in the urban area, the sustained operation and management of such facilities is not implemented due to problems in terms of operating capacity and budget. In addition to promoting appropriate maintenance of the sewerage system in the urban area, it is worth examining the installation of low budget but effective "Combined Treatment Septic Tank (CTST)" in peripheral areas not included in the urban area. CTST is characterized by aeration in biological treatment tank and combined collection of domestic wastewater and human excreta. In Japan, rapid technical advances are being made in CTST, which are now capable of reducing BOD discharge levels to 20 mg/litre or less. Another advantage is that these facilities can be individually installed in areas that have no roads and are unsuitable for constructing sewerage lines.

Taking the case of Peshawar as an example, efforts are being made to protect river water quality by disseminating the sewerage system and constructing city sewerage channels in important urban areas based on the sewerage plan indicated in Figure 7.2-5. However, in the suburban areas and peri-urban areas shown in Figure 7.2-5, no plans for waste water treatment exist. In such areas, it will be important in future to consider the introduction of combined treatment plans for domestic wastewater and human excreta based on the installation of Combined Treatment Septic Tanks (CTST) and water collection systems serving hundreds of people per community. Figure 7.2-4 illustrates a typical structure of CTST in Japan.

Concerning the introduction of combined household wastewater treatment facilities to communities in Peshawar, since these facilities boast a BOD removal rate of more than 90% and can sustain a discharge water quality of 20 mg/l, it is anticipated they can have a similar

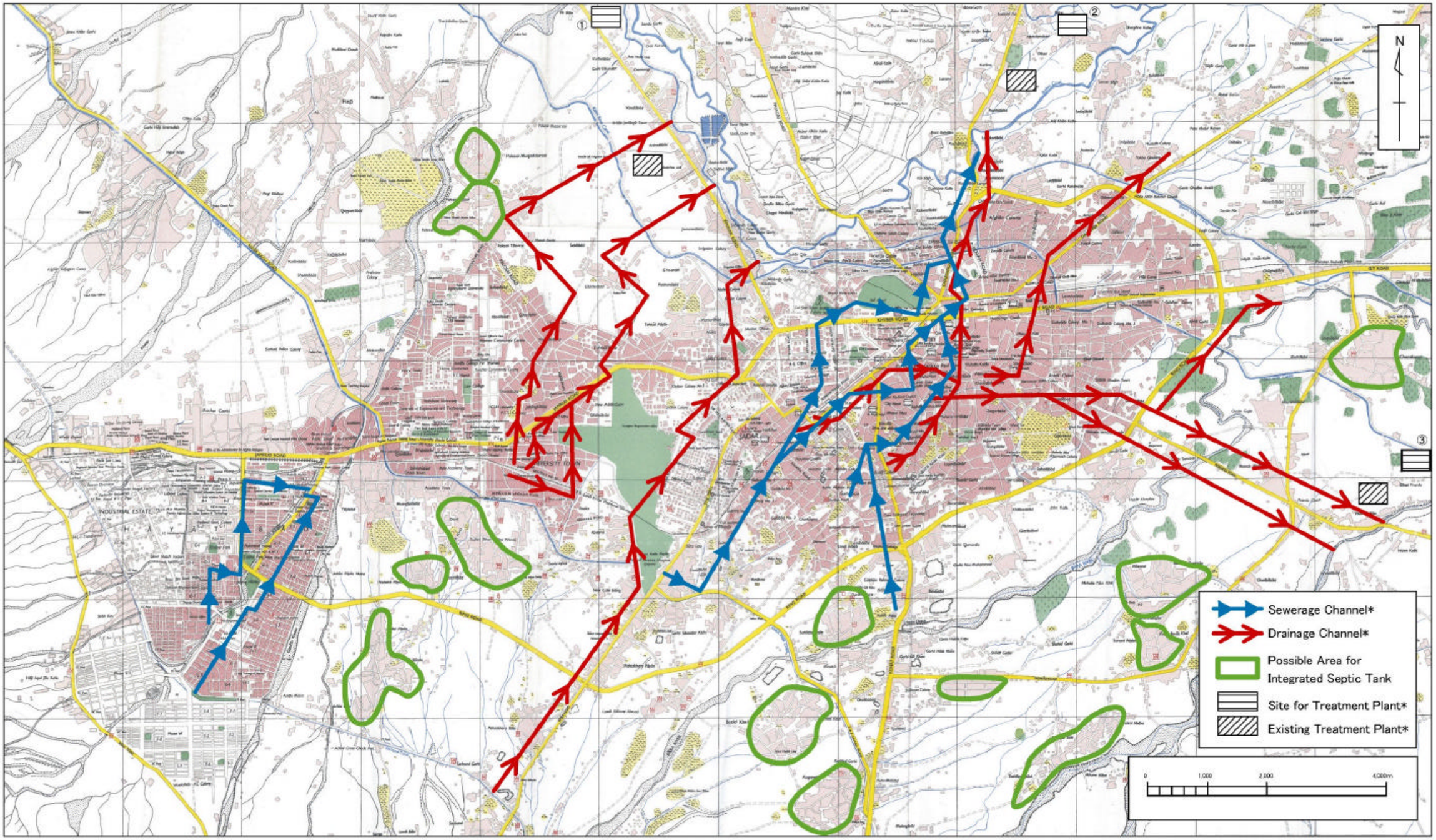
or better effect than lagoon-type sewerage systems that already exist in the city. Moreover, because a treatment tank has enough capacity to serve around 500 people at a maximum, they possess ample potential for application to suburban communities.

However, it is necessary to examine issues concerning the sustained operation and maintenance of facilities. In the sewerage system master plan for 25 cities in Pakistan (2002), it is scheduled to minimize the user burden to 7.5 Rs (approximately 15 yen) per household per month, and maintenance costs will be augmented by selling treated effluent for agricultural use and using treated sludge in the cultivation of fruit trees and fish, etc. inside treatment plant grounds. Moreover, since the civic service tariff for water supply and waste collection is 20 Rs (approximately 40 yen) per household per month, when it comes to disseminating Combined Treatment Septic Tanks, it will be necessary to conduct public education campaigns and to consider the balance between maintenance cost and an appropriate tariff setting that can be borne by users.



(Combined collection treatment, premises sewage treatment septic tank)

Figure 7.2-4 Schematic Combined Treatment Septic Tank



* Source: Master Plan for Urban Wastewater (Municipal and Industrial) Treatment Facilities in Pakistan, June 2002

Figure 7-2-5 Sewerage / Drainage Systems and Possibility for Introduction of Combined Treatment Septic Tank in Peshawar