

# Charging for Use of Natural Resources

## Practical Lessons for Lake Basin Managers

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As discussed in Chapter 9 on Finance, it is recognized that there are three distinct sources of potential new funding for improved lake basin governance:

- Local sources (including user fees and other locally generated revenues),
- National level financial resources, and
- International funding including both bi-lateral and multi-lateral funds.

This note focuses on the first of these, namely how to generate more local revenues by charging for the use of the lakes' natural resources. The examples used here include not just lake-related but include cases from other areas such as entrance fees to national parks or marine parks because the general ideas are fully transferable and there is much that lake basin managers can learn from the management of other natural resources.

### Generated Funds Locally by Charging Users of Natural Resources

Lakes have values as natural ecosystems and produce valuable services-both within the lake (e.g. fisheries, recreation, and transportation) and beyond the borders of the lake (e.g. water supply for agriculture, industrial, and municipal uses; habitat for migratory birds; storage of water and flood control benefits among others). Lake Basin managers are beginning to learn that since these services are valuable, it is also possible to devise systems whereby those who benefit from these services also help pay the costs of management of lake systems. If there were no values created by well-managed lakes, there would be no willingness to pay by those who benefit.

Although people value many different services from lakes, they normally prefer to not pay any fee or charge and receive these services for free.. This is natural - everyone enjoys receiving "something for nothing" - and this is a particularly important issue when one considers natural resources. Sometimes people think that a natural resource like a lake or a fishery is a "gift from God" and should be available for use without payment. (No one makes the same argument when hiring a taxi, eating a restaurant meal, or

going to the cinema!) In other cases people feel that they already pay taxes and therefore the Government should provide the services without collecting any additional fees.

Lake managers themselves have traditionally looked to national or local government budgets for funding. Now there is an increasing recognition that additional funding can be generated directly from those who benefit from the lake (the users). Consequently, a new source of funding for improved lake basin governance is *locally generated revenues*, either paying for services (e.g. **user fees** like drinking water charges or recreational charges) or fines for pollution (e.g. **pollution charges** like wastewater discharge fees). These funds are collected from various groups: those who are direct users (and beneficiaries) of the lake resource such as fishermen; those who benefit from the lake as a source of ecosystem services (e.g. various people who benefit from flood mitigation, improved water supply, or enhances amenity values); or those groups whose activities pollute or harm the lake (e.g. industries or municipal wastewater disposal systems).

In this note the definition of "locally generated funds" is broad enough to also include revenues from those downstream users who are directly linked via the ecosystem. This means that a downstream beneficiary may be an important source of funding for lake managers. This is especially true if the downstream uses are high valued uses such as drinking water or hydropower generation (and these same users also have a high ability-to-pay, that is, they are well-off). For example, **Lake Biwa** in Japan is fortunate to have large and wealthy downstream stakeholders. Lake Biwa has been very successful in attracting money from Osaka and Kobe for investment and management costs to help protect the Lake's resources and ensure continuing water supply (protecting both quantity and quality) to these large urban areas. In fact, total public investment by downstream water users in the Lake Biwa region for lake management totals hundreds of millions of dollars.

*Private funding* is a subset of locally generated funding and is usually only important when the number of stakeholders is very small and the community is both relatively rich and socially cohesive. One can think of small lakes with a small number of owners/lake users who band together to make

needed investments and enforce certain management policies. This has been observed around some small lakes in the US where the primary use is recreational, and in fact most “externalities” have been “internalized”. Private funding is only rarely seen in practice (usually where the lake is small and the number of stakeholders is also small) and almost never observed in larger lakes or where large numbers of stakeholders are involved. However, private funding via donations can be an important additional source of money. These private donations are often targeted to specific management objectives, such as protecting water bird habitat, or improving a sport fishery by means of a stocking program. In the United States, for example, there is an active NGO that collects donation to help protect and manage lake and wetland habitat to increase duck numbers. This group is supported by duck hunters who want to improve their chances of “success” when hunting wild ducks.

Two innovative ways to increase funding at the Lake level is the use of **user fees** and **pollution charges**:

*User Fees paid by those who benefit from a healthy lake environment.* Locally generated (and locally retained) financial resources often take the form of some sort of “user fee”-perhaps from fishermen or recreational users, or from those who consume a lake resource such as drinking water. A *user fee* is a charge that is paid by someone who *derives a benefit* from the direct, or indirect, use of the lake and therefore has both an interest in the conservation and management of the lake’s environment, and an implicit responsibility to help pay for that conservation and management. In Box 1, for example, user fees from fish pen operators in **Laguna de Bay** in the Philippines (about \$120 per ha per year) have become an important source of funds for the lake development and management authority. In Laguna de Bay the user fees are divided between different stakeholders-the Laguna de Bay Lake Development Authority (LLDA), and the local Government units. In this way both those who are responsible for management (the LLDA), and the villages around the lake that are also affected by the development of fish pens, receive a portion of the revenues collected and become active stakeholders in the sustainable management of the fish pen operations.

Tourism, both national and international, is another excellent example where user fees (admission fees, daily use charges) can be developed and begin to produce revenue for improved lake management. This is a well-established practice and has been implemented in a number of lakes where tourism is an important use-for example, in **Lake Nakuru**, visitors to the national park to see the flamingos all pay a user fee. The user fee can then help support the management and conservation costs of the Lake. This practice could be expanded to other lakes, especially where there is a clearly defined lake-based recreational activity (c.f. **Lake Baringo**). But these funds need to be applied to the lake and not to central Kenyan Wildlife Service coffers. Retaining the funds collected (or at least part of them) is

always a point of tension between Lake basin managers and the national Government. Creative solutions include both having NGOs collect the funds and manage their use, or splitting the funds collected between different groups (this is a common solution to the problem). In the case of the Cancun Marine Park in Mexico, for example, the fees collected are split between the National Treasury and two local groups - communities bordering the marine park, and the Park management authorities.

Another major use of Lakes is for transportation. Fees can be established for boats that use the Lake’s waters - these fees normally take the form of an annual license fee. While one normally thinks of charging fees on ferries and freight carrying boats, recreational craft can also be licensed and pay a fee. Again, the feasibility of this approach depends on the numbers of boats involved, income levels of those being licensed, and the institutional structure in the lake. It is important that the Lake basin managers have the legal right to impose a fee and use the revenues for improved management. The fee should be labeled a “lake environment management fee” to distinguish it from normal boat licensing fees. Fishing licenses are similar to the transportation-linked fees. In this case licenses can be issued to either the fishermen directly (commonly done for sports fishermen and including both those who fish from boats and those who fish from shore) or to the fishing boats themselves. Again, as with transportation licenses, the new fee can be labeled a “lake environmental management fee” to distinguish it from normal boat licensing fees.

Setting user fees is an interesting process. In almost all cases the user fee is less than the true value of the resource being used. This is commonly observed in water supply systems where user fees often just cover operations and maintenance (O & M) costs but do not pay any of the initial capital costs. In irrigation systems user fees often do not even cover O & M costs. This is neither surprising nor a major problem. People do not like to pay for the services of any ecosystem (as mentioned before, there is a feeling that natural resources are a gift from nature and should be free!). User fees for recreational uses are often a few dollars per day per person (and sometimes with a two-priced system differentiating between local and international users). Some of the practical concerns about establishing and collecting user fees are discussed later.

However, setting ANY user fee begins to establish the principle that these resources have value (and alternative uses or opportunity costs). Thus implementing even a partial user fee system starts to send the correct market signal and can begin to generate some revenues for improved management, as well as promoting more conservative use of the resource (a positive effect of a per cubic meter water charge for irrigation and potable water users is that they often reduce their consumption, and waste less water, since water is no longer “free”).

*Pollution Charges paid by those who harm the lake environment.* Fees can also be levied on those whose actions potentially damage the lake and its sustainability. Pollution charges or levies are therefore a potential source of funding and serve a double purpose-if there is pollution this charge helps generate revenue to address the pollution issues or compensate those who are hurt by the pollution. In addition, pollution charges also serve as an incentive for polluters to decrease their pollution and therefore avoid paying the pollution charges. In theory pollution charges could be paid directly by the polluter to those whose welfare is hurt by the pollution. This is administratively very hard to do. In most cases these charges are collected by some central institution and then payments are allocated to various groups-both those whose welfare is hurt as well as other stakeholders in the basin. Sometimes the charges go to the central treasury and the lake managers must fight to get some share back to pay local compensation. In **Lake Dianchi** in China, pollution fees are used (in addition to more commonly observed water supply charges), to raise revenues. Some tens of millions of dollars are invested each year to reduce water pollution in the Lake, and part of this money comes from the fees paid by the polluters themselves. Box 2 discusses the situation in **Lake Dianchi**. Pollution charges are an excellent example of establishing an economic link between the person or firm creating the damage and making payments to correct the problem (or compensate those who are hurt by pollution). The polluter can then decide to pollute and pay the charge or reduce pollution and pay less. Such systems, however, are NOT easy to implement. They require a high degree of organization to both monitor the production of pollution, establish the appropriate charges, and collect the fee. This is obviously easier to do where there already exists a compliance (monitoring and enforcement) infrastructure, and where the number of polluters is manageable. If the main polluters are a few large industries or a limited number of large vessels it may be possible to introduce pollution charges.

If the polluters are many small firms or hundreds of small fishing boats it will probably be very difficult to introduce a pollution charge system. In such settings a more effective way to reduce pollution may be to set certain standards for boat engines, or industrial processes, thereby reducing pollution but not actually collecting any revenue. Monitoring and enforcement are still required but are less difficult than with traditional pollution charge systems. The Lake basin manager must assess the types of activities producing pollution and then determine which approaches are likely to be most effective in addressing the problem.

Whether it is a user fee or a pollution charge, the idea is to establish a connection between those who benefit from using the lake resources (or negatively affect its quality), and the costs required to maintain the same resource. These fees and charges help to generate revenue for improved management. A user fee or a pollution charge also reinforces the idea that a lake and its resources have value and

therefore have to be used wisely. Free resources and free goods tend to be overexploited and poorly managed and resource degradation is common. Think of the condition of many common property resources including oceans and seas, lakes and public parks. When money changes hands (and a market is functioning) it sends the correct signal: a lake and its resources are valuable and scarce, and one has to use the lake resources wisely. Fees and charges help to re-enforce this message (it costs you money to use it) and also help provide funds for needed conservation and protection (to ensure availability of the resource over time).

### **Lessons Learned on Successfully Charging for the Use of Natural Resources**

There are a number of main lessons that have been learned in developing charge systems for the use of natural resources (including lakes):

- Clearly identify the causal links between the natural resource (the Lake) and those who benefit from its use;
- Estimate the size of the benefit to users and their ability to pay;
- Recognize that for some uses (e.g. recreation) there may be a large difference in the ability to pay of nationals and international users. Use different pricing systems to set the appropriate charges;
- Create an efficient fee collection mechanism so that the administrative costs are low with respect to the amount collected (e.g. always consider the cost-effectiveness of any proposed new collection system);
- Recognize that those benefiting may be located both on or near the Lake, or at some distance away. Develop charging systems appropriate to both groups;
- Develop appropriate mechanisms to collect and administer the fees charged;
- Information is key to establishing a new fee structure - it is important that the general public, the direct beneficiaries, and government all understand both the benefits that are being generated by the Lake as well as how any monies collected will be used for improved management.

We now consider each of these lessons.

#### *Identify clear Links between the Lake and its resources and the Users.*

In general, people are very reluctant to pay additional charges if they do not perceive any link between what they are being asked to pay for and their own well-being. On the other hand, if people perceive this link between themselves and the Lake they are often much more willing to help pay to support improved Lake Management. For example,

people who use the Lake for recreation (e.g. swimming, boating, and fishing) are often willing to pay some sort of user fee. A user fee usually takes the form of a license or a permit, often on an annual or per-season basis for fishermen or boaters. Recreational users often pay a daily fee. In all cases the users receive a benefit from using the Lake, and recognize that they have an obligation to help pay something to help maintain the resource.

This causal link is easier to establish when the link is direct and clear - for example recreation, fishing, transportation, or water supply for drinking, irrigation, or industrial use. Information and education about the value of a Lake's resources can help make these links better known and will increase the willingness of Lake users to help pay for the resource and thereby contribute to improved Lake management.

*Estimate the size of the benefit to the user and their ability to pay.*  
The larger the benefit from using the Lake's resources to a user, the more the user will be willing to pay to ensure that the benefits continue. Actual willingness to pay is of course constrained by the ability to pay. Poor people may have little cash income and be unable to pay much. Wealthier people will have larger cash incomes and are able (and usually willing) to pay more. It is unrealistic to expect very poor people to pay much even if the resource is very important to their lives. Similarly, if the perceived benefit from using the Lake's resources is very small from the perspective of the user, the willingness of an individual to pay will also be small. A variety of economic valuation techniques exist that can be used to help estimate the size of the economic benefit to users. The experience of other Lake basin managers in establishing fees and charges is also a valuable guide.

*Use different pricing systems to reflect different levels of the ability to pay.*

When there are several different groups using and benefiting from the same resource (e.g. recreational uses, fishing, water supply), and these different user groups have very different income levels, it may be wise to develop a fee system that recognizes these difference in ability to pay. Many Park managers, for example, recognize that there can be a large income difference between local or national users of the Park and international visitors. There is no reason why ALL users have to be charged the same price - any single admission price, for example, may be too high for national visitors and too low for international visitors to the same site. Just as many land parks or museums charge different prices to students and to adults, in the case of recreational uses of natural resources it may be very beneficial to develop different admission fees for national and international visitors. In this way it is possible to increase revenues collected without imposing an unfair burden on national users who may have lower income levels than international visitors.

In Costa Rica, for example, the Parks System used to charge one price/ fee for all users-both Costa Ricans and foreigners. The Ministry of Natural Resources and the Park managers realized that there were two quite different "populations" using the Parks: the local Costa Rican population, that in general had low incomes, and an international visitor population that had much higher average incomes. A new Fee system was developed which kept the charge for Costa Rican visitors low (about \$1.00 per visit at each park) while non-Costa Rican visitors paid a fee of \$5.00 or more per visit at each park. This system has worked well, has had very little or no impact on the numbers of international visitors (their numbers are in fact increasing), and has greatly increased revenues for Park management. Since the fees charged Costa Ricans remain low, there is very little public resistance to the dual fee structure.

This sort of two or three level pricing is commonly found around the world. In some cases, as in the Galapagos, Ecuador, the difference in entrance fees are very large -- \$6 for Ecuadorians and \$100 for foreigners to enter the Park. When the resource being visited is unique or very rare (e.g. the Galapagos in Ecuador, Victoria Falls in Africa, Lake Baikal in Russia) the fee charged international visitors may be very high, even if national visitors pay very little.

If there is strong resistance to charging national citizens any fee it is also possible (although probably undesirable) to set the fee for locals at zero (\$0). (For example, this is done at a popular marine park in Hawaii, Hanauma Bay, where Hawaii residents pay nothing and everyone else pays \$5 per visit.) However, note that in general it is better to charge a small admission fee to local populations rather than charge nothing. A small fee, even if it does not generate much revenue compared to revenues generated from non-local users, sends the correct signal: the lake and its resources have value, the lake cost money to manage, and the lake and its resources are deserving of public support. In addition, there is the practical consideration that it is much harder to move from charging no fee (as in Hawaii for residents) to charging any amount, than it is to increase an existing fee as incomes rise. Therefore establishing the principle that users need to pay something is good for the environment and also good public finance policy. And since a fee is already being collected from international visitors it is very cheap to also collect a fee from national visitors.

A final point of establishing a fee system - Keep It Simple! Although there is some logic in establishing a series of fees reflecting many different characteristics that affect ability to pay (e.g. age, income level, nationality, time of use, intensity of use, and other factors) in practice it is better to have a simple, transparent system. Many resource managers have found that a two (or three) tier system works best - usually differentiating by nationality (Nationals versus foreigners) and sometimes having a special rate for either seniors or students. A simple system is easier to implement, requires fewer checks and controls, and is less subject to abuse.



*Carefully consider the cost-effectiveness of any fee collection system.*

It costs money to collect money. Any new fee or charge has to pass a “cost-effectiveness” test whereby the costs of collection should only be a small portion of the amount of fees collected. There is no hard and fast rule but in general the share of total revenues used to collect fees should be as small as possible - perhaps 15% or less. In contrast, a collection system that cost 50 cents or more for every dollar collected would not be very efficient.

Keeping collection costs low often involves one or more of the following steps:

- Use existing systems to collect the fee. If there are fee collection systems that are already functioning, both governmental and private, they can be used to help collect the new charge. Examples include adding an environmental charge to monthly utility bills, using tour operators who provide visitor trips to collect an admission fee as part of the cost of the tour, or having hotels in resort areas add on the environmental management fee to the hotel bill.
- Use volunteers to help collect fees. Many countries have volunteer groups that help manage parks and other natural resources. This can be a low-cost way to establish a “presence” in the area and collect fees, answer questions, and increase public involvement in management.
- “Bundle” fees with other charges that are paid. Related to the first point made, if users are already paying a water utility fee or an electricity fee, it may be possible to “bundle” an environmental fee onto the existing fee and use that system to collect the environmental use fee. This saves a great deal of money in establishing a separate fee collection system, and also helps show the users that there is a link between the service that they are using (e.g. water supply, hydro electric power) and the lake and watershed that are helping to generate those benefits. Similarly cruise ships, or Lake excursion boats, can add a small “environmental management fee” to all ticket prices. Cruise ships already include port charges in their bills - they could also include an environmental management fee.
- Collect fees at the point of entrance to Parks and Lakes (if possible). Collecting fees can be done quite efficiently if users enter at one location and can be charged at the point of entrance. For example, sometimes all visitors pass through one port, or airport, or site to use a resource. In the Galapagos, ALL visitors come by air and the entrance fee to the Park is charged at the Airport before people go through security. (The Park covers 97% of the islands land surface.) Foreigners pay \$100, Ecuadorians pay \$6 and Galapagos residents, who have a special residency card, pay nothing. It is a

very efficient way to collect the fee and all visitors have to pay, even if they do not enter the Park.

- If access to the Lake is very open and there is no single point of entry, it may be much more cost-effective to collect user fees via those businesses that provide services to the users. These include license fees for boats and other Lake-based service providers. It is important to be creative and recognize that there will always be some “leakage” from people who should pay the fee but do not. This is unavoidable and a quick benefit/cost analysis will indicate what types of collection efforts are justified by the revenues each collection option will generate.

*Develop charging systems for both those near to the Lake and for those who benefit from the Lake’s resources but live in other locations.*

There has been much focus on developing user fee systems for those people who directly use the Lake and its resources - recreational uses, direct water supply, transportation, fisheries and other uses. There are other important user groups, however, who are removed from the Lake itself. Examples include those who are downstream consumers of potable water provided by the lake, or those who receive flood protection benefits from the Lake’s ability to absorb storm waters.

These users can also help pay for improved lake management - however, since they do not personally visit the Lake any fees must be collected by other means. As mentioned earlier water users can pay an environmental management additional fee on their water utility bill to help protect the Lake ecosystem. Others who benefit may be asked to pay via a surcharge or fee added to Property Tax or some other bill that they normally pay. Since no one wants to pay more for anything, both political will and public information are needed to introduce such new charges. In Costa Rica, for example, the municipality of Heredia has imposed a small per cubic meter fee on the existing potable water bill to help protect and manage the upstream watershed that provided the city’s water supply. This is a well-known example of the developing field of Payment for Environmental Services (PES) and has great potential applicability to Lake basin management.

*Develop appropriate mechanisms to ensure that funds are used for improved Lake Management.*

If collecting money and new fees is not always easy, spending the money wisely may be even more challenging. Efficiency in using new fees is very important - both to actually help improve Lake management, but also to encourage those paying the fees to continue to pay them willingly. In addition to using existing Government programs to deliver improved management, it may also be desirable to consider other less conventional options. These may include the following:

Parastatals, organizations that are part-public, part-private, may be an efficient way to use new revenues to deliver targeted services. A number of Parks and recreation areas use parastatals to both collect fees and deliver management services. This can help side step the common issue of whether or not fees collected have to go to the National Treasury. The parastatal can get around this thorny issue, and has been used in a number of countries in the Caribbean and in Central America to retain fees collected at the local level and to improve management of protected areas.

NGOs (non governmental organizations) are similar to parastatals and can also be very effective. Whether a parastatal is better, or an NGO is better, in part depends on each country's laws and traditions. NGOs are more independent than parastatals, and this can be both a benefit (they may be more responsive and cost-effective in delivering management services) and a negative (should fees from using a public resource go to an independent NGO?)

Revenue splitting, whereby money collected is split between the National government and the local authorities can be an effective way to get "buy-in" from national governments and local groups to increase revenue capture. As mentioned earlier, in Cancun, Mexico, a new user fee system was put in place for the National Marine Park and revenues (about \$3 per visitor from the several hundred thousand visitors per year) were divided between the National Government, local communities, and the Park management. The impact of this approach has several benefits - there is increased "ownership" of the resource and its management by all sides, and the local authorities now have a direct incentive to collect the fees. In the past, all fees went to the National Treasury in Mexico City, almost nothing came back to the Park, and therefore there was no incentive to collect fees at the Park level (and no money to hire staff to do so). Retaining all (or part) of the money collected at the local level creates a very strong incentive to successfully implement any new charging system.

Other creative means. The above list is not complete - many other examples could be given but the aim is usually the same: to increase revenues by effectively collecting new monies, developing mechanisms whereby increased revenues are (at least partly) retained and managed locally, and then using those revenues wisely in a cost-effective manner to better manage the resource.

#### *The importance of public information*

It is very difficult to introduce a new fee system if the public at large and the Government are not fully briefed and in agreement. Public information plays a crucial role in developing the public and political "will" to take the necessary steps to introduce any new fee.

It is somewhat curious but international visitors / users are often much more willing to accept new fees than are national populations and governments. Perhaps it is

because international visitors have more knowledge about the natural resource being used, and express their values by going to the effort to visit the site. International visitors may also have more education and income, both of which have a positive impact on the willingness to pay for natural resources and the ability to pay for them. This was clearly seen in the study of Lake Sevan in Armenia where Armenians living abroad (who in general had much higher income levels than Armenians in Armenia) were much more willing to pay fees and make donations to help preserve Lake Sevan than were Armenians in Armenia. A creative Lake basin manager will tap into different sorts of increased revenues - both inside and outside of the country.

It has also been observed that when any fees are first proposed there is often considerable resistance from local populations. The argument is often made that the services of the Lake were free before and should continue to be free. Once a fee system is introduced, however, and especially if there is an observable improvement in management and services, the new fees become accepted. This issue places a substantial responsibility on Lake basin managers - both to provide information on why a fee system on users is justified and important, and also to provide improved and more sustainable results. If there are no visible changes or improvements, or if no information is made available and public awareness is not enhanced, then the public will consider the fees and charges as just another tax and will resist their introduction.

## **Conclusions**

Many opportunities exist for increasing revenues for improved Lake Management by charging for the use of natural resources. In those locations where no fees are being collected, introducing any system can be a bureaucratic and legal challenge. Once systems have been introduced, however, there are many options for "fine tuning" the fee structure to increase revenues. There is no single correct approach - it depends on each Lake's particular set of resources and users, and the local institutional (and cultural) circumstances. However, as a famous Chinese leader once said "It does not matter if it is a black cat or a white cat, just so long as it catches the rat!". Similarly, creative managers will find different ways to increase revenues by charging for the use of a Lake's natural resources - the important thing is to actually increase revenues and then use them wisely.

### **Box 1      User Fees in Laguna de Bay, the Philippines**

The Laguna de Bay managers have used several different types of user fees to help both generate revenues and provide an incentive for polluters to reduce pollution.

Introduced in 1997, the Environmental User Fee System (EUFS) is designed to help reduce pollution loading in the lake system and is composed of a fixed fee and a variable fee. The fixed fee covers the administrative costs of implementing the system and the variable component is based on the BOD concentration of the effluents. The current threshold level for BOD is 50 mg/L. The combination of a fixed fee (a Command and Control measure) and the variable fee (an economic-based instrument) has been effective in both meeting administrative costs and encouraging firms to reduce their pollutant levels. The EUFS has been implemented in stages with the larger firms affected first.

Revenues from a separate user fee on fish pen operators are shared between the local government units and the Laguna de Bay Lake development Authority (LLDA). The fee, currently about US\$120 per ha of fishpen, generates revenues for improved lake basin management and makes the lakeshore communities active stakeholders in lake basin management.

These two fees have been effective in achieving two important goals - developing a source of local funding for the LLDA and lake shore communities, and providing an incentive for industrial polluters to reduce their emissions to the lake.

### **Box 2      Pollution charges in Lake Dianchi, China**

Lake Dianchi near Kunming, China is the center of a major urban, industrial and tourism region. Pollution from industry, agriculture and urban sewage was a major problem. The lake authorities have made major investments in sewage and waste water control. In the year 2000 they spent over RMB 340 Million (about US\$ 41.5 million). To address the ongoing problem of industrial pollution, the lake authorities have combined a pollution levy system with a loan/ grant program for installation of pollution control equipment.

Starting 15 years ago old industries were charged a pollution levy if their discharges exceeded the stated discharge standard. In addition, the 1988 Dianchi Protection Ordinance prohibits the introduction of any new polluting industries in the Lake Dianchi catchments.

Existing industries, when taking actions to control pollution, were provided with loans from the government for the required investments. These loans were funded by a combination of the environmental pollution levy receipts plus special funds allocated for Lake Basin environmental improvements. As an added incentive, if it was shown that after the pollution controlling investments were made that the industry could then meet the pollution discharge standards, the loan was converted to a grant and no repayment was required. By combining government investments, pollution levies, and a loan/ grant program for pollution controlling investments, the lake management authorities have begun to tackle the major problem of pollution of this important lake.