

10. How Can The Concepts Of Industrial Ecology Be Implemented?

WHILE INDUSTRIAL ECOLOGY, in principle, sounds like an attractive option, how can this be implemented? By definition, it calls for a broad system level outlook. This requires the cooperation of different sections of society and the approach has to be multi-disciplinary. In these days of specialization, and considering the way societies are organized, is it not asking for too much?

The reader could well ask: What can I do to put into practice the concepts of Industrial Ecology?

While implementation of these concepts in their full perspective could take some time, it may be useful to start thinking of Industrial Ecology as an elegant philosophy. This philosophy can be applied in whatever **work group** in society that one may belong to—be it management of agriculture, industry, environment or any other.

Listed here are some possible uses of this new planning platform by a few identified user groups. Neither the list of user groups nor the application possibilities outlined are intended to be exhaustive. They are more illustrative.

If different sections in each local community can adopt this philosophy, it will be easier for system level planners to use the concepts at a macro level to plan more sustainable societies

10.1 Environment Planners

Resources Impact Assessments

In most parts of the world, an Environment Impact Assessment (EIA) has become mandatory. While there is no uniform format for an EIA, very often these reports do not reflect truly the impact of an economic activity on the resources of the region. Thus it may be useful to have Resource Impact Assessments. These would

give the environment planners a clear idea of the current demand on the available resources. Based on such data, it will be easy to predict the likely future impact on the resources of a region. This could be the basis for licensing new activities. For example if the environment managers receive a request for locating a steel plant, they will be able to decide whether they can meet the water requirement of the steel plant over the next few decades. They could also calculate easily the likely secondary demand on water resources as an outcome of locating the steel plant (for instance, the increase in population). Based on this analysis, the environment planners may choose to either refuse permission or insist that the industry find its own sources of water (set up desalination plants and use desalinated sea water, for example).

Carrying Capacity of Regions

Since a regional Resource Flow Analysis (RFA) would clearly bring out the resources consumed and the wastes generated locally, the carrying capacity of a region can also be determined.

Waste Source Identification

Again, since the data on the use of different materials are easily available, it will be possible to identify sources of any specific wastes or pollutants. For instance, if there is a case of high cyanide content in any lake or stream, it is necessary to identify waste streams that are likely to contain cyanide and start an investigation.

Promoting Recycling of Wasted Resources

The RFA, if prepared, would throw up clear data to assist the environment planner to set up possible waste exchange programs.

Setting an Agenda for Action

Since the relative quantities of waste generation can be made available from an RFA, the planner can set priorities, elaborate specific agendas for action, and prepare well-directed action plans. The aim would be to first target the activity most harmful to the region. This can be illustrated with reference to vehicular pollution in cities. (In many developing countries there could be more than 25 different kinds of motorized vehicles on the road.) From a Resource Flow Analysis (RFA) and a Resource Utilization Map (RUM) for different fuels, the contribution of each type of vehicle to the total pollution load in a city can be precisely assessed and analyzed. To improve the air quality in a city, targeting the largest polluter

could be made a priority. It will also be possible to make specific quantitative assessments of the likely results from such action, set clear quantitative targets, and evaluate any progress achieved.

10.2 Industry Planners

Data from the regional RFA could be effectively used by industrial development agencies in developing countries.

Evaluating the Merits of Different Industrial Activities

Given the limited resources in the region, they could promote those industries that give maximum returns per unit of resource consumed. These parameters will have to be locale-specific and meet best with the overall objective of the local government. Some of the parameters used to evaluate the relative merits of different optional industrial activities could be:

- Per capita income per kiloliter of water consumed/ per kWh of energy consumed/per acre of land used
- Employment generation per kiloliter of water consumed/per kWh of energy consumed/per acre of land used
- Foreign exchange earned per kiloliter of water consumed/per kWh of energy consumed/ per acre of land used

Using Wasted Resources

Since the RFA would clearly give the wasted resources in a region, the industry planner could specifically promote industries that use wasted resources. New business and employment opportunities could emerge from this resource optimization strategy, in addition to contributing to the environmental sustainability.

10.3 Companies and Business

Sustainability Studies

Data from an RFA of a region can be of immense use to industries while locating a new commercial activity. A detailed analysis of resource availability is essential

for the long-term survival of the business in any area. In addition to assessing the availability and prices of resources as they are today, it is necessary for companies to make an assessment of their availability in the future. Even if the industry can afford to pay for the higher cost of a raw material, caused by rising demand, if it is overusing a scarce resource, it would not be able to exist in harmony with the local community. The case of the leather industry in Tamil Nadu amply illustrates this point.

Such studies would also be in line with business fulfilling its social responsibilities.

New Business Opportunities

Studying the data on the wasted resources in a region from an RFA could be the starting point for setting up new commercial ventures that effectively use these wasted resources.

Substituting Inputs

An understanding of the wasted resources could also help to find cheaper or better substitutes for inputs/raw materials by using the wastes available (either in the same form or after processing) in the region.

Product Design and Innovation

Data on the resource availability in a region and a forecast of availability could help companies to develop products that use less of any resource that is or could become scarce. If coal is likely to become scarce in a region, the company manufacturing coal-fed boilers has to start redesigning the product to use other fuels. An RFA could serve as an early warning system and allow the company to strengthen its assets and increase its competitiveness.

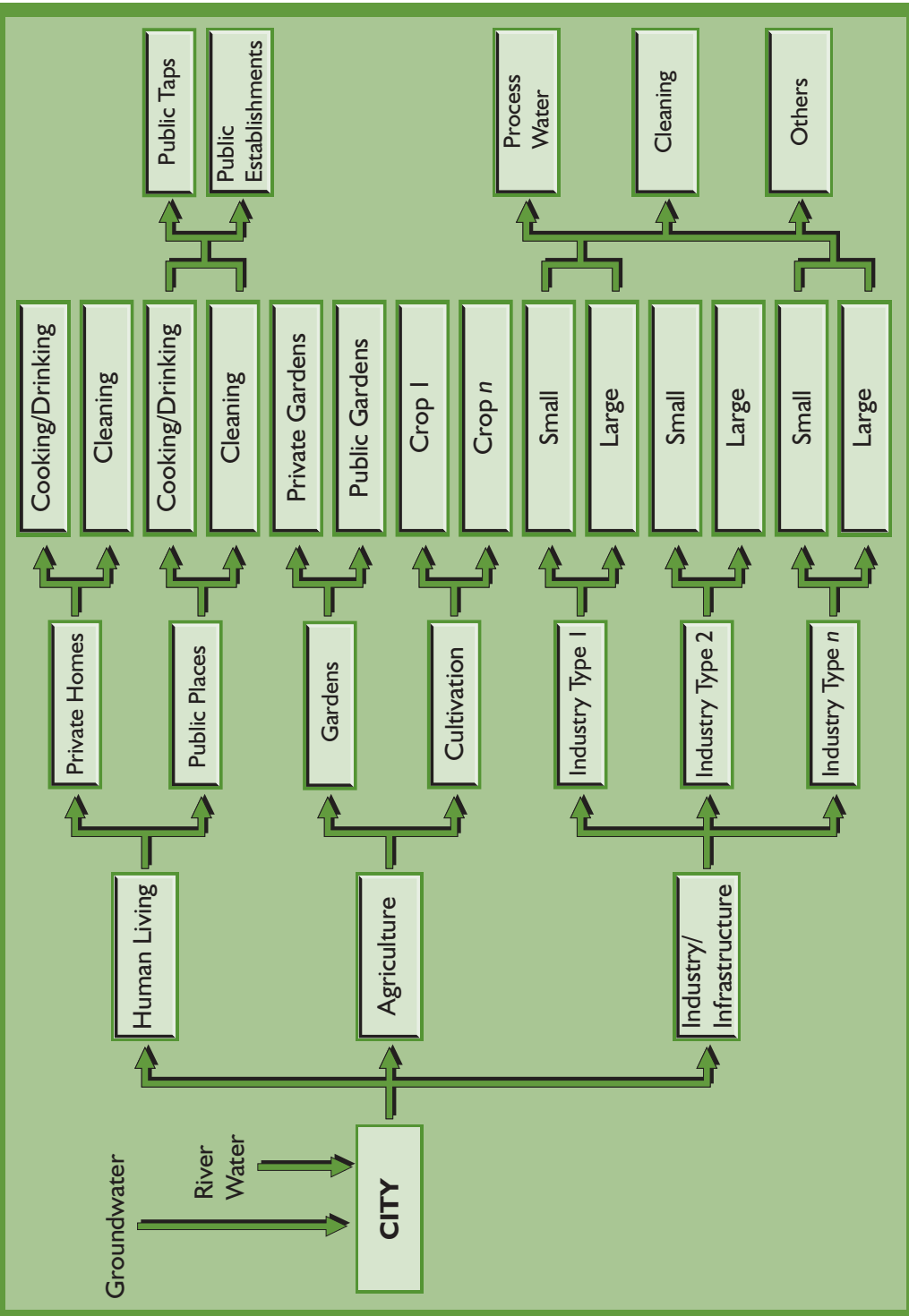
10.4 Public Utilities

Planning and Demand Forecasting

Understanding how resources are used would be essential to planning and forecasting demand. None of the cases contained in this book fully illustrate the concept of RUM for planning utilities, but a typical RUM for a city could be as depicted in Figure 10.1.

FIGURE 10.1

Resource Utilization Map (RUM): Water in a Typical City



Control of Wastage

Data generated from an RUM could also be used for planning effective distribution of resources and for plugging leakages from the system. Such data would immediately focus the utility manager's attention to the areas of maximum consumption and would help him in planning meaningful and effective action.

Help Consumers Improve Resource Productivity

From an analysis such as this, the utility manager will also get a clear picture as to which of his consumers need help, advice and support in improving their resource productivity.

Similar analyses could be used to understand how any other resource such as energy or fuel is used in a defined area.

10.5 Energy Managers

A detailed RUM would be extremely useful to energy managers to know how and in what form energy is being used in a region where they are operating. Not only will this help them in planning and forecasting demand for energy by different sectors among their consumers, but also it would help them to target specific sectors for promoting new or renewable energy sources. For example, if the energy company can estimate the part of the energy that is used by their domestic consumers to heat water, they could promote solar heating systems, in areas where it is normally sunny.

An RUM can be prepared for energy in a way that is very similar to the example that is presented in Figure 10.1.

10.6 Agriculture Planners

Understanding the relative patterns of use of resources by different agricultural activities could help set the agenda for the agriculture planner. He could decide which of the following should be the focus of his work.

Planning Cropping Patterns

The planner could promote the idea of new cropping patterns. For example, if the region is short of water, it may be necessary to slowly plan a shift to crops that give better yields per kiloliter of water used.

Promoting New Technology

For example, to reduce the water consumption, new irrigation methods such as drip irrigation could be promoted.

The data could also help in:

- Better distribution of water or other resources
- Setting an agenda for improving yields per unit of resource used (water, land or pesticide)
- Setting an agenda for promoting new farming practices
- Better assessment of use of pesticides and fertilizers (per unit of production) and their impact, if any, on land or water

Possible New Parameters

The RFA and RUM methodologies would allow the agricultural planner to develop new parameters (beyond traditional yield or output) like:

Employment per acre of land, kiloliter of water or unit of energy

Per capita income per acre of land, kiloliter of water or per unit of energy

Foreign exchange per acre of land, kiloliter of water or unit of energy

Such new parameters would help to develop innovative, integrated complexes, combining agricultural and industrial activities. They could be directly beneficial to farmers and local communities, while improving the health of the rural ecosystem.

10.7 Land Use Planners

The data from an RUM for land could help the land planner in:

- Understanding the use of land by different sectors
 - Planning the allocation of land for different sectors
 - Planning the location and spatial distribution of different activities
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10.8 Development Agencies

National and international development agencies and funding institutions would be one of the major users of data from an RFA. They could use the data to:

Prioritize Work

By studying data on resource flows, while planning work in a given region, such institutions could focus their efforts in fields that directly impact the critical resources in the area. This will bring maximum benefit to the local community. There will be greater appreciation for their work and will ensure the involvement of the community. Even if the focus of the institution is on rural development, the planners could focus on optimizing the resources of the region and work towards greater productivity of the local resources.

Evaluate Options to Maximize Resource Productivity

Data from an RFA of the region could be used as a decision-making tool. Preference would be given to projects that could potentially maximize resource productivity. For example, in a sun-drenched area, if the choice was between a project to introduce solar energy in local industry versus improving the efficiency of the present oil-fired heating system, the choice could be for promoting solar energy solely or in combination with conventional fuels to maximize resource productivity.

10.9 Transport and City Planners

Transport and city planners could effectively 'dematerialize' the system. They could create an RUM for the transport infrastructure (the identified resource) and gain an understanding of why people travel (for example, the number of kilometers traveled by people going to school, office, post offices, railway stations, etc.). The total load on the transport infrastructure and the total fuel consumption in a region could be reduced by either bringing services closer to the people or by planning self-sufficient suburbs, thereby eliminating or reducing the need for people to travel.
