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Environmental Assessment Studies of Lime Kilns at Maihar (M. P.)

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Abstract

Environmental Assessment (EA) describes the whole process by which information about the environmental effects of a project is collected and assessed. In a developing country like India an "environmentally compatible development" has to be evolved for which Environmental Impact Assessment is the only answer. EIA of a development project provides the necessary management guidelines and in deciding the corrective measures to be adopted in managing the environmental system. Lime is a natural material, which is collected from nature as limestone since time immemorial all over the world. But the usual process of extraction in the lime kilns has also caused concerned on account of its potentiality of polluting the environment particularly air, water and soil.

In present investigation an attempt has been made to assess the environmental impacts of lime kilns at Maihar (MP) Battelle Environmental Evaluation System (BEES) has been applied in the present assessment study. The addition of environmental impact unit values of all the four sections (Categories) i.e. Ecology, Environmental Pollution, Aesthetics and Human interest provide with a over all negative values as - 476.6 and 36 positive values. In case of no industry situation the EIU values might have a total of 150. This indicates that due to lime kilns and on going mining and expansion work and also other related activities approximately 56.07 % of the over all environmental quality is negatively affected or likely to be affected while only 3.6% of the benefits could be sought in improving living standard.

Key words: ***Environmental Assessment (EA), Environmental Quality (EQ), Environmentally Compatible Development (ECD), Battelle Environmental Evaluation System (BEES).***

Introduction

In a developing country like India an " Environmentally Compatible Development " has to be evolved for which Environmental Impact Assessment is the only answers. EIA of a developmental project provides the necessary management guidelines and in deciding the collective measures to be adopted in managing the environmental system.

Environmental Assessment (EA)

Describes the whole process by which information about the environmental effects of projects is collected and assessed by the developer before deciding to grant planning permission. The expression "Environmental Impact Assessment" (EIA) is also in common use and for practical purposes means the same as EA.

Lime is a natural material, which is collected from nature as limestone from time immemorial all over the world. But the usual process of extraction in the lime kilns has also caused concern on account of its potentiality of polluting the environment particularly air, water and soil.

Methods

For the purpose of computation of environmental impacts, an environmental evaluation system was developed in 1972 at Battelle Laboratories for the bureau of reclamation. In this system, about 78 environmental parameters grouped in 17 components are organized into 4 categories. The feature of this method is that the impacts are compared in the common units. This is a fairly ideal approach since environmental factors are measured in different units.

The steps involved in development of commensurate units include:

1- Estimation of various environmental parameters.
2- Transformation of parameter estimates into environmental quality scale (EQ)
3- Assignment of importance weight to the individual parameters.
4- Multiplication of scale value by importance values to obtain environmental impact units(EIUs).

Transformation of parameter estimates into an EQ scale is based on the fact that there is certain range of anticipated values for a given parameter with the range depends upon the units of measurement of the parameters.

Assignment of importance units to each of the individual parameters is based on the ranked pair wise comparison technique in which subjective judgment determines the relative importance or significance of individual parameters. The Battelle Environmental Evaluation System developed for reclamation has 1000 PIUS distributed into 4 major categories. In the present study this distribution adopted with certain modifications, taking into account only the relevant environmental parameters.

The whole process includes following steps

1- Obtaining of the parameters data without the project for each of the relevant environmental factors.
2- Conversion of these parameter data into EQ scale values.
3- Multiplication of these scale values by the PIU for each of the individual parameters to develop a composites chore for the environment with the project.

Environmental Impact Analysis

Battelle Environmental Evaluation System (BEES) for environmental assessment was developed byDee *et al.* 1973 Relevant environmental parameters where identified for the purpose of present study based upon this system.

Parameter importance weight for most of the parameters in the present investigation have been kept similar to those of Dee *et al.* 1973 developed for reclamation projects. Some of the new parameters and also slightly higher parameter importance weight values have been considered to give enough importance and relevant assessment.

A few of parameters though not very relevant were retainedto honour the spirit of the inventor of the system. The environmental parameters selected for the present study as well as the importance weights for each parameter are present in Figure-1.

The environmental parameters selected for the Presents study are described as under:

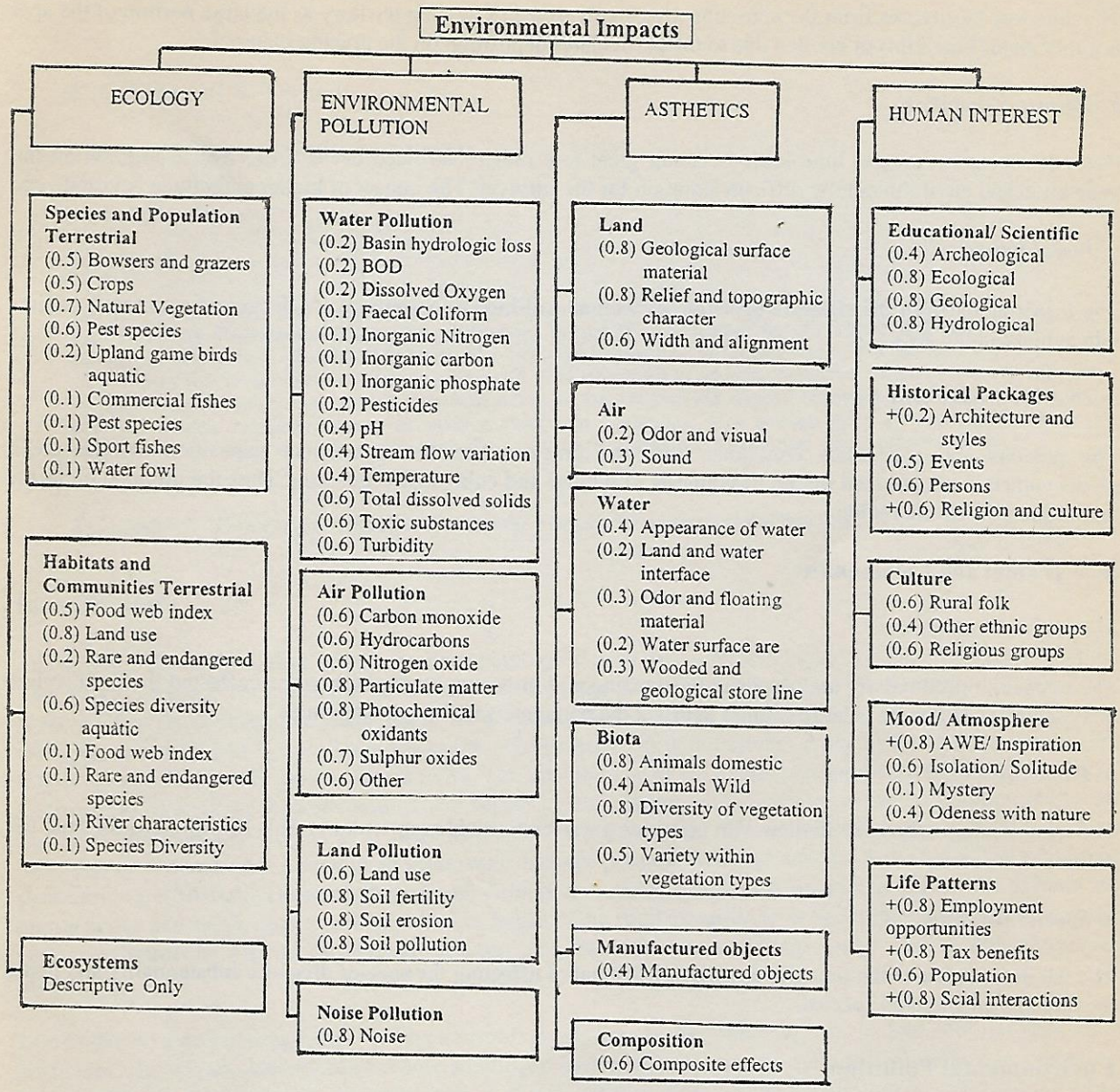

Figure - 1: Importance Weight Unit (IWU) for Various Descriptors of Environmental Quality

Ecology

This has been divided into two sub-sections:

A. Species and population - Aquatic and Terrestrial
B. Habitat and Communities - Terrestrial and Other Communities.

A. Species and Population

a- Browsers and grazers

The domestic herbivores from the adjoining area are deprived of grazing territory as the large portion of the area is either under lime kilns or spoiled due to the particulates deposition on the grazing material.

b- Natural Vegetation

Natural Vegetation around lime kilns is facing great loss rather sacrificed because of adverse impacts on the vegetation and environmentally difficult situation for the survival. The impact of higher magnitude is visualized.

c- Insect Fauna

The insect fauna from the natural vegetation as well as soil insect community are destroyed as a result of lime kiln activity in the area.

d- Over all productivity

The gaseous and particulate emissions from the limekiln and the subsequent deposition on the green photosynthetic area affected the photosynthesis of natural and cultivated vegetation. Thus the ultimate impact is on productivity of the region.

B- Habitat and Communities:

a- Food web Index

The impact on productivity and the denial of grazing and browsing by the herbivorous affected the food web in this region. The kiln site is large enough to affect the parameters with high magnitude.

b- Land Use

The land use earmarked for the lime kiln companies was earlier under agriculture. This has changed the land use pattern of the area.

c- Species Diversity

The whole complex of the limekiln area has a potential of affecting the species diversity substantiality and hence the rare and endangered species.

Environmental Pollution

This section has been divided into four sub-sections:

a-Water Pollutionb- Air Pollution c- Land Pollution d- Noise Pollution

a- Water Pollution

The deposition of the particulate emission from the lime kilns on the surface of the water degrades the water quality.

b- Air Pollution

The operation of lime kilns needs a great amount of fuel consumption. This leads to the emission of oxides of carbon, nitrogen, sulphur, hydrocarbons and the particulate matter. The lime kilns thus are potent enough to alter the air quality.

c- Land pollution

The dumping of the solid waste and their wash outs during rains cause soil pollution in a limited area. The soil erosion and soil degradation is not much due to lime kiln operation. The impact thus assessed is of low magnitude.

d- Noise pollution

The lime kiln processes and transportation activities are contributing to the noise pollution to a limited extent.

Aesthetics

The third section is on aesthetics witch include six subsections, as follows.

a- Land b- Air c- Water d- Biota e- Manufactured objects
f- Composite Effects

a. Land

The land waste dumping from lime kilns and particulate deposition on the land surface spoils the overall look of the land area around lime kilns, thus causing bad visual impacts.

b- Air

Consumption of fuel causes odor and visual impacts due to the dense smoke generated by the lime kiln operation, there by affecting the aesthetics of the area.

c- Water

Particulate deposition on the surface of water and lime waste wash outs duringrains spoils the visual beauty of the water bodies and badly affected the aquatic biota.

d- Biota

As mentioned earlier animals (both domestic and wild) and diversity of the vegetation types have been severally affected because of lime kilns coming up in the area.

e. Manufactured objects

Since, no proper planning for the lime kiln area is done, the construction structures are coming up in a disorganized manner, thus causing deterioration in the aesthetics of the project site.

f- Composite effect

The composite effects of various structures and activities are negatively affecting the area.

Human Interest

The last section on human interest has following sub sections.

a- Ecologucal and hydrological b. Historical c. Culture d. Mood/atmosphere e. Life patterns f. Health status

a- Ecological and Hydrological

The ecological and hydrologic parameters (particularly ground hydrology) are moderately negative in the project site.

b- Historical

The Maihar area has historical importance. It is one of the important pilgrimages of Hindus.Maa Sharda temple is visited by thousands of pilgrims every year. Any damage to the ecology of the area will cause negative impact on the pilgrimage.

c- Culture

Present project does not have any serious impact on the cultural aspects of the region, but would definitely affect the cultural relations and would also have an impact on the local inhabitants.

d- Mood/ Atmosphere

Since the economic opportunities would be plenty, the local population would be inspired to take up new ventures. The growth in the population would affect the solitude of the local people and may also have some negative impacts on the general attitudes towards the nature and natural process.

e- Life Patterns

As a result of lime kilns coming up, people will get enough opportunities and there would be substantial increase in the population due to migration from adjoining areas. The region would be benefited by trade taxes and increased industry worker population would open up newer avenues for social interactions.

f- Health Status

The workers and the people living around lime kilns are suffering from various health problems due to lime kiln.

Computation of Commensurate Impact Value

Due to time constraints it was not possible to measure and estimate each one of the environment socio-economic parameters identified and chosen for the present study. An objective assessment of various parameters in terms of 'Environmental Quality' has been done after inspecting the project site as well as the lime kilns several times. The values are presented in Figure - 2.

The transformed environmental quality values in turn are multiplied with the importance weight values to obtain Environmental Impacts Unit (EIU), which are presented in Figure - 3.

The addition of environmental impact unit values of all the four sections (categories) provided us with an over all negative values as - 476.6 and 36 positive values. In case of no industry situation the EIU values might have a total of 150. This indicates that due to lime kilns and on going mining and expansion work and also other related activities, approximately 56.07% of the over all "Environmental Quality" is negatively affected or likely to be affected while only 3.6% of the benefits could be sought in improving living standards.

The irreversible commitments of resources like fuel, raw materials, electricity, cannot be avoided. The lime kiln dust and poisonous gases are fouling air, water, and soil system significantly. Worker engaged inlime kilns operations and other activities are suffering from various diseases.

Conclusion

The limekilns are the structures built to meet the lime requirement of the country, which have serious impacts on local environment. In the present study an attempt has been made to highlight various environmental impacts caused by lime kiln activity at Maihar. The environmental impact analysis in the present study revealed that adverse impact on local environment due to lime kiln activity at Maihar is 56.07%. This clearly indicates an adverse impact on the environmental system and point out the degree of damage to the existing environmental system as 56.07%. Obviously, the lime kiln activities are disastrous in terms of existing environment and would destroy the environmental system in long term.

The lime kilns have a great on impact various ecosystem components.Lime kiln emissions affect the vegetation growing in the vicinity negatively. A part from emitting gaseous andparticulates pollutants from lime kilns generate heat, which increases the temperature of its environs. All these factors in combination affect the plant life negatively with invariable loss in vitality and vigor, and ultimately biological and economic yield. The air and water quality is badly effected due to emissions from lime kilns. Emissions from lime kilns are affecting various environmental components both biotic andabiotic drastically.

The health and welfare of mankind is intimately linked with the viability and productivity of natural and agricultural ecosystems. Evidence accumulated so farhave clearly demonstrated that both the integrity and yield of these life-supporting ecosystems can be adversely affected by air pollution. The air quality control management and impact assessment aims at a healthy and aesthetically pleasing environment. Air pollution is no longer merely a local or a national problem, but has squired global dimensions.

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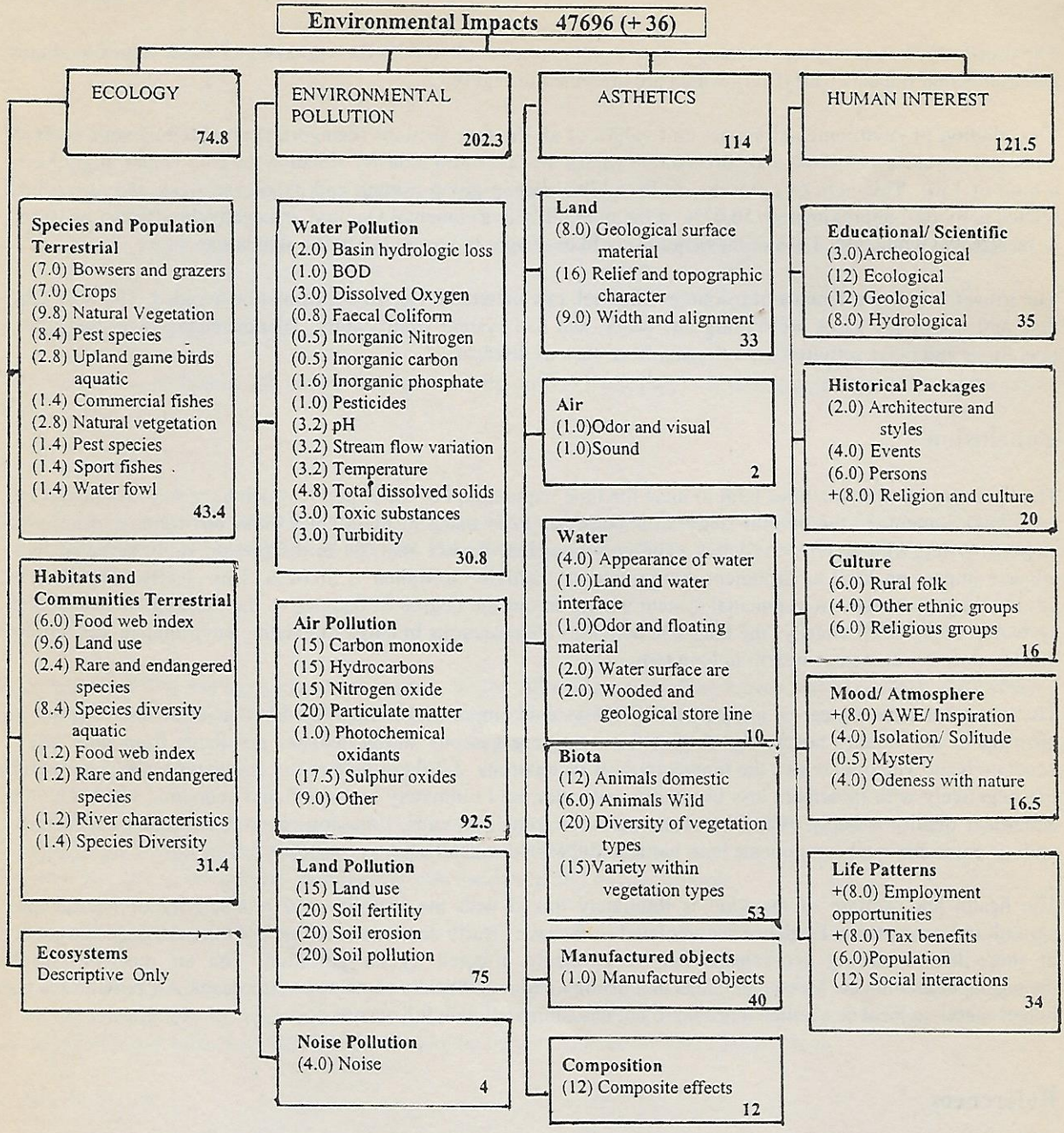

Fig. 2: Environmental Impact Units (EIUs) for Various Descriptors of Environmental Quality
(Numbers in parenthesis are parameter importance unit (PIU) and number at bottom represents the total)

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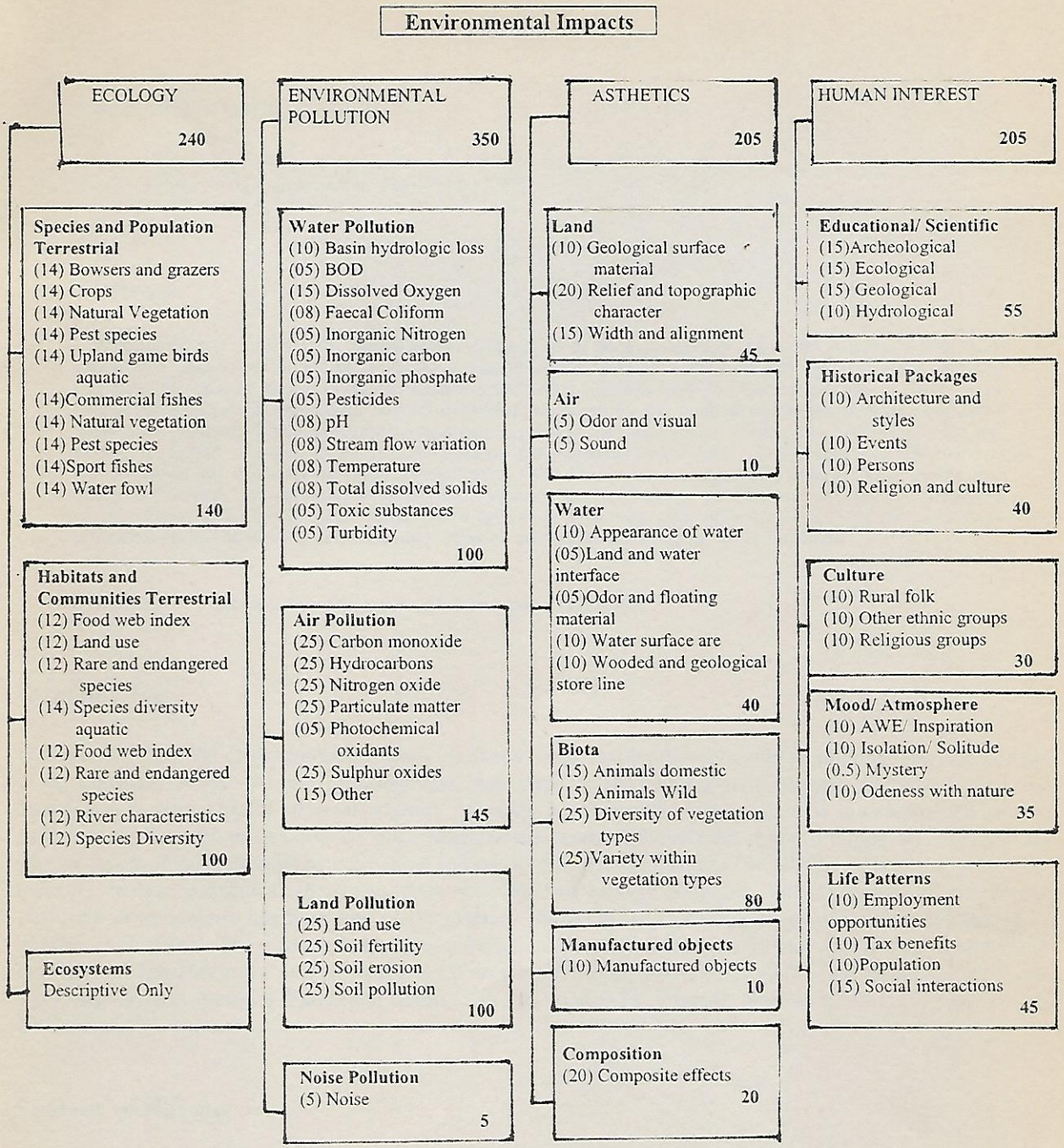

Fig. 3: Basttele Modified Environmental Evaluation System

(Numbers in parenthesis are parameter importance unit (PIU) and number at bottom represents the total)