

## **ECONOMY AND ENVIRONMENT**

The natural environment is an important component of the economic system, and without the natural environment the economic system will not be able to function. Hence, in recent years economists have started treating the natural environment in the same way as they treat labor and capital as an asset and a resource. According to environmental economists, environmental degradation is the result of the failure of the market system to put the deserving value on the environment, even though the environment serves economic functions and provides economic and other benefits. It is argued that, because environmental assets are free or under-priced, they tend to be overused and abused, resulting in environmental damage. The solution offered to the above problem is to put a price on the environment so that it can be incorporated into the economic system and taken seriously by those who make decisions. However one of the major problems in putting a price on the environment is that it is highly objected by many as it is similar to putting a price tag on your family and friendship. Another problem with valuing the environment is that the preferences of future generations and other species are not taken into account.

### **Economy and environment interaction**

It is a general belief that we can't have both economic development and environmental quality simultaneously, that if we want to improve economically we must sacrifice the environment. Often in the past Economic Development has been given importance over the environment and society. There is a mutual connection between environment and economy that is often not recognized. There is a widely held theory that resource management practices and policies which protect the environment are most likely to harm the economy and reduce employment opportunities. However, empirical data supporting this theory are rare. In recent years, economists and ecologists have increasingly begun to use quantitative methods to test this theory. Studies examining industrial emissions, endangered species, air quality and other issues have found no evidence that economies suffer as environmental policy strength increases. On the contrary, numerous researchers have reported slight positive correlations between environmental and economic indices, suggesting that environmental health may help to improve the economy.

Methods are being developed to measure the value of clean water and air, and healthy forests throughout the world. Estimated values vary widely, but studies agree that clean, rivers, clean air, biodiversity, and open space are highly valued by the public and that the public is willing to pay to preserve and enjoy these resources. For example, properties near clean rivers have been found to be worth more than similar properties elsewhere. Another rapidly expanding field of study is the valuation of "ecosystem services". Ecosystem services are the processes by which the environment produces resources that we often take for granted such as clean water, timber, and habitat for fisheries, and pollination of native and agricultural plants. The following is list of the positive impacts of environmental protection on a nation's economy.

- Environmental protection prevents pollution and the related cost of health care.
- Reduction in pollution results in increased yield from agriculture and cattle.
- A healthy environment supports healthy human beings and increases productivity.
- In a protected environment, the effects of natural calamities such as drought and flood will be less.

- Environmental protection produces job opportunities in the field of green industries and ecotourism.
- As policymakers begin to incorporate environmental conservation into resource management laws and practices, the quality and sustainability of our lives and economies will improve.

### **Environmental economics**

*Environmental economics is a branch of economics concerned with environmental issues.* Environmental Economics involves theoretical and empirical studies of the economic effects of national or local environmental policies around the world. Particular issues in environmental economics include the costs and benefits of alternative environmental policies to deal with air and water pollution, toxic substances, solid waste, and global warming. Thus environmental economics addresses environmental problems and valuation of nonmarket environmental services. In general, environmental economics focuses on efficient allocation and accepts the assumption of neoclassical economics that the economic system is the whole and not a subsystem of the global ecosystem.

### **Economics of development**

The standard measure of economic progress around the world is the Gross Domestic Product (GDP). *GDP may be defined as the total market value of all final goods and services produced in a country in a given year, equal to total consumer, investment and government spending, plus the value of exports, minus the value of imports.* GDP accounts for the money value of all exchanges of goods and services, regardless of their social or environmental value. The costs of oil spills, crime, traffic accidents, and cancer operations all are accounted in the GDP. There are other alternative indices, which account for social and environmental costs and benefits and more accurately track whether we are really happy as a result of economic growth. Such indices show a decline in recent decades. For example, the Index of Sustainable Economic Welfare (ISEW) paralleled the GDP until about 1966. Since then the GDP has continued upwards, but the ISEW stayed constant

### **Preservation and Conservation**

The terms *preservation* and *conservation* are often confused, but there is a difference between them. *Preservation implies complete protection, and leaving the natural resources totally untouched. Conservation implies the management of resources on a sustainable yield basis.*

Preservation is the process of protecting an environment without any alterations or human intervention. It is a necessary tool in certain cases. Absolute wilderness and certain unique habitats for wildlife must be kept intact. On such areas man can acquaint himself with unspoiled nature and scientists can study the complex ecology of natural communities. Animals threatened with extinction must be totally protected so that man can continue to enjoy and learn from them.

Conservation, however, means the wise use of a renewable resource. Trees and most animals of a forest are renewable resources. There is an annual surplus that can be harvested safely by man. Wildlife cannot be stockpiled. Each unit of land has a certain

carrying capacity for each species, a limit to the number of that species it can support. A land unit may temporarily support an excessive population (like at the end of the reproductive season), but mortality factors will inevitably reduce the population. Protection will not alter this basic law of population biology.

Thus conservation is the process of protecting the environment while taking reasonable benefits out of it without causing major damage to it. For example in animal populations safety does not lie entirely in numbers. Wildlife sometimes can be overprotected. The results of allowing a deer herd, deprived of its natural predators, to multiply beyond the carrying capacity of its habitat have been documented in the past. Poor growth, weakened physical condition, and starvation are sure to follow. The severely damaged forest takes many years to recover, reducing its value for not only deer, but other wildlife as well. The reproductive potential of most animals exceeds the carrying capacity of their habitat (more animals are born each year than the habitat can support). If untouched by humans, the surplus will be removed by mortality factors such as predation, starvation, disease, or other natural causes. If used wisely by humans, the surplus can be harvested without risk to the next year's population.

Conservation encompasses the maintenance of environmental quality and resources or a particular balance among the species present in a given area. The resources may be physical (e.g. fossil fuels), biological (e.g. tropical forests), or cultural (e.g. ancient monuments). In modern scientific usage conservation implies sound biosphere management within given social and economic constraints, producing goods and services for humans without depleting natural ecosystem diversity, and acknowledging the naturally dynamic character of biological systems. This contrasts with the preservationist approach of protecting species or landscapes without reference to natural change in living systems or to human requirements.

### **Sustainability: Theory and Practice**

Under this section two key theoretical concepts in ecology related to economics namely Carrying Capacity and Ecological Footprint (EF) are discussed in detail with the practical solutions to the impending problems pertaining to same.

#### **Carrying Capacity**

*The carrying capacity is the number of individuals an environment can support without degradation.* The concept of carrying capacity is used in determining the potential of an area to absorb developmental activities and is

- The level of land use, human activity, or development for a specific area that can be accommodated permanently without an irreversible change in the quality of air, water, land, or plant and animal habitats.
- The upper limits of development beyond which the quality of human life, health, welfare, safety, or community character within an area will be adversely affected.

The concept of carrying capacity also applies to Earth and the human population. Earth's carrying capacity will eventually impact the size of the human population. It has been estimated that the carrying capacity of the Earth is somewhere between 10 billion and 15

billion people (there is a wide variation in the predicted carrying capacity of earth by various scientists).

Human life depends on healthy ecosystems which supply life-sustaining resources and absorb wastes. However, current growth and consumption patterns are placing increasing stress on ecosystems. Environmental degradation, biodiversity loss, deforestation, and the breakdown of social and economic systems are a few of the signs which indicate that ecosystems are stressed. From an ecological perspective, adequate land and associated productive natural capital are fundamental requirements for the existence of civilizations on Earth. However, at present, both the human population and average consumption are increasing while the total area of productive land and stocks of natural capital are fixed or in decline.

Some scientists argue that the carrying capacity of our planet can be improved by technology such as increased food production from the same land, waste treatment technologies etc. However, some argue that the carrying capacity of the planet is going to reach critical levels due to population growth and increased per capita consumption of resources.

### **Ecological Footprint (EF)**

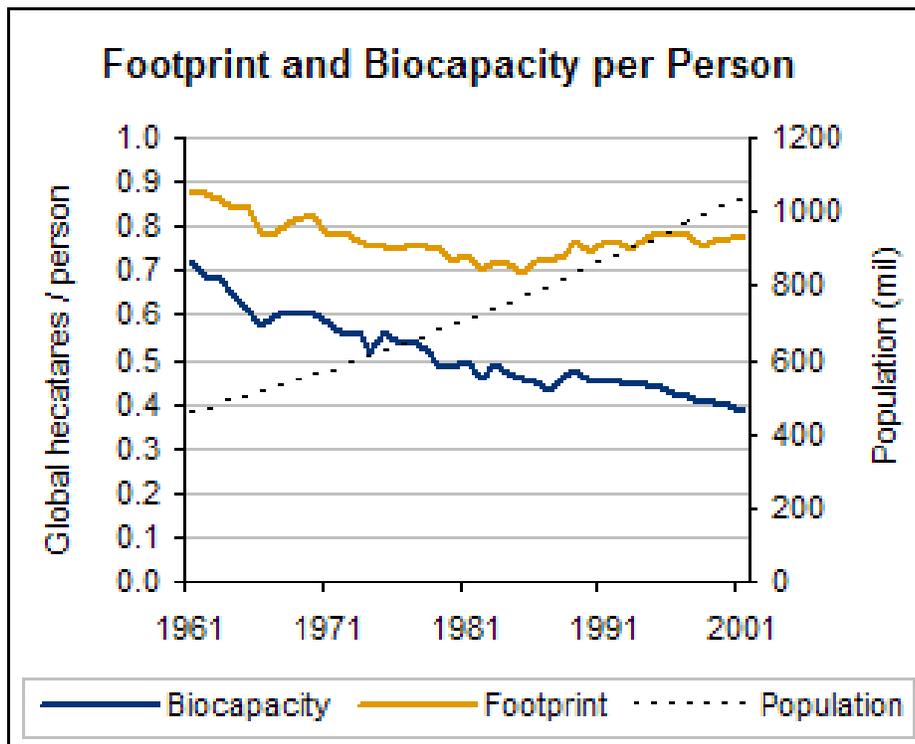
The Ecological Footprint is a measure of the load imposed by a given population on nature. It represents the land area necessary to sustain current levels of resource consumption and waste discharge by that population. *Your ecological footprint is the biologically productive area required to produce the natural resources you consume and the land required to dispose of the waste you generate.* Researchers at the University of British Columbia estimated four to six hectares were required to maintain the lifestyle of each average North American in 1990. The Ecological Footprint provides a systematic resource accounting tool that can help us plan for a world in which we all live well, within the means of our one planet. Ecological footprint calculations are based on two simple facts:

1. We can estimate most of the resources we consume and many of the wastes we generate.
2. Most of these resource and waste flows can be converted to a biologically productive area necessary to provide these functions.

A nation's ecological footprint corresponds to the aggregate land and water area in various ecosystem categories to produce all the resources it consumes, and to absorb all the waste it generates on a continuous basis, using prevailing technology. The Earth has a surface area of 51 billion hectares, of which 36.3 billion hectares are sea and 14.7 billion are land. Only 8.3 billion hectares of the land area are biologically productive. The remaining 6.4 billion hectares are marginally productive or unproductive for human use, as they are covered by ice. As the population of this planet increases the availability of per capita productive land decreases and this makes it impossible to continue with the present life styles of developed countries. At present the EF of the citizens of developed countries are much higher than that of their under developed counterparts. The EF of many of the countries including India is much more than its actual area. It is the need of the hour to reduce our EF through sustainable life styles.

EF is essentially a concept, seeking to stabilize net global consumption within total production levels and is more concerned with "ecological modernization" to reduce material flows. This concept seeks to force rich consumers to confront the distant economic, ecological and social consequences of their consumption levels and to highlight the need for international agreement on sharing the earth's capacity more equally. As an analytical tool, EF can be used as a measure at community, regional or national level, in order to estimate imported carrying capacity and the gap between actual and "sustainable" consumption levels, based on per capita land demand and global per capita land available.

Another term used in association with ecological footprint is the biocapacity. The biocapacity measures the bioproductive supply, i.e. the biological production in an area. It is an aggregate of the production of various ecosystems within the area, e.g. arable, pasture, forest, productive sea. Some of it is built or degraded land. The biocapacity of earth is estimated as approximately 11.3 billion global hectares. Biocapacity is dependent not only on natural conditions but also on prevailing farming/forestry practices. The EF and biocapacity of an average Indian citizen is shown in the figure for a period of 1961 to 2001.



The global Ecological Footprint was 2.2 global hectares per person (a global hectare is a hectare whose biological productivity equals the global average) in 2001. This demand on nature can be compared with the Earth's biocapacity, based on its biologically productive area, which is a quarter of the Earth's surface. The productive area of the biosphere is an average of 1.8 global hectares per person in 2001. Thus in 2001, humanity's Ecological Footprint exceeded global biocapacity by 0.4 global hectares per person, or 21 per cent. This global overshoot began in the 1980s and has been growing ever since. In effect, overshoot means spending nature's capital faster than it is being regenerated. Overshoot may permanently reduce biocapacity. The global Ecological Footprint can be reduced by the following general strategies.

- ***Increasing or at least maintaining biocapacity.*** This requires the following.
  - Protection of soil from erosion and degradation, and preserving cropland for agriculture rather than urban development.
  - Protection of river basins, wetlands, and watersheds to secure freshwater supplies
  - Maintenance of healthy forests and fisheries.
  - Actions to protect ecosystems from climate change.
  - Elimination of the use of toxic chemicals that degrade ecosystems.
- ***Improving the resource efficiency with which goods and services are produced.*** Over the past 40 years, technological progress has increased the resource efficiency of production systems. But although efficiency gains are critically important, they have not been enough to stop the growth of the global Ecological Footprint.
- ***Reducing the consumption of goods and services per person.*** The potential for reducing per person consumption depends on the person's income level. People at subsistence level need to increase their consumption to move out of poverty. But wealthy individuals can shrink their footprint without compromising their quality of life, by cutting consumption of goods and services with a large footprint.
- ***Lowering the global population.*** Population growth can be reduced and eventually reversed by supporting measures which lead to families choosing to have fewer children. Offering women better education, economic opportunities, and health care are three proven approaches.

The above strategies could be implemented through the following specific measures.

#### ***New economics***

- Incorporate socio-economic (market and non-market) values of ecosystems and their services in management decisions.
- Integrate ecosystem management goals in sectors such as agriculture, forestry, finance, transport, trade, and health.
- Promote agricultural technologies that enable increased yields without causing harm to the environment like excessive use of water, nutrients, or pesticides.
- Give higher priority to ecosystem restoration and conservation investments as the basis of development.
- Adopt an ecosystem-based management approach for marine and fisheries policies that provides for a sustainable fisheries sector and protects vulnerable species and habitats such as over-harvested fish species, coral reefs and seamounts.
- Account in economic terms for the elimination of negative impacts of chemicals on human health and environment to encourage higher development, growth, and innovation.
- Give deployment funds for regional or national development on the condition of the conservation of nature and ecosystem services.

#### ***Better regulations***

- Provide accurate and relevant information to decision makers and the public about the social and economic value of functioning ecosystems.
- Develop certification systems to ensure the sustainability of product manufacturing and resource use.
- Educate the public about the challenges and opportunities of sustainability, addressing issues such as climate change, forests, and fisheries.
- Eliminate subsidies having adverse social, economic, and environmental effects.

### ***Trade and development***

- Establish a transparent system to monitor subsidies, lending, and grant mechanisms. Integrate conservation and sustainable use of natural resources in development programmes through country and regional strategy papers.
- Ensure that development and aid policy is coherent with other policies, particularly in regard to environmental impacts occurring in developing countries.

### ***Green infrastructure***

- Work with nature, not against it. Functioning ecosystems provide us with “natural infrastructures”. Wetlands, for example, naturally manage flood risk and treat water.
- Make transport pricing reflect the full social and environmental costs of road, water, and air travel, and encourage public transport over private car use.
- Implement comprehensive waste reduction systems, giving priority to controlling hazardous substances.
- Introduce building design requirements and incentives that reduce waste, and water and energy use.

### ***Climate change***

- The challenge of moving from a fossil fuel economy is investing in alternatives that truly reduce humanity’s footprint, rather than putting more demand on other ecosystems.
- Develop certification criteria for non-fossil energy sources to ensure these sources reduce, rather than merely shift, the environmental burden of energy use.
- Build energy systems that free the country from the high cost of fossil fuel imports while advancing innovation and know-how in new energy technologies

### **Limits to growth**

***Limits to Growth*** is a book published in 1972 modeling the consequences of a rapidly growing global population by the Club of Rome (The Club of Rome is a Germany based organization that deals with a variety of international political issues.). The book used a model to simulate the consequence of interactions between the Earth's and human systems. The book has sold 30 million copies in more than 30 translations making it one of the best selling environment books in world history. This book predicted that economic growth could not continue indefinitely because of the limited availability of natural resources, particularly oil. The energy crisis of 1973 increased public concern about this

problem. Ever since the term limits to growth has become a key concept associated with environmental economics.

The Limits to Growth described the prospects for growth in human population and industrial production in a global system over the next century. A system dynamics model was used to simulate investments in food supply and resource production needed to keep pace with the needs of a growing world. The model also simulated the generation of persistent pollutants and the ability of the environment to absorb and degrade the pollutants to harmless form. The model was used to study futures with widely different estimates of the total food supply, the total resource base, and the role of technology to improve production and efficiency. The simulations led the authors to conclude the world system could not support present rates of economic and population growth much beyond the year 2100, if that long, even with advanced technology. The researchers then used the model to study the most likely pattern of accommodation with the limits in our global system. The major conclusions that can be drawn from this concept are the following.

- If the present growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years. The most probable result will be a sudden and uncontrollable decline in both population and industrial capacity.
- The limits to growth are the more likely outcome given current attitudes and policies about growth, technology and the environment.
- It is possible to alter these growth trends and to establish a condition of ecological and economic stability that is sustainable far into the future. The state of global equilibrium could be designed so that the basic material needs of each person on earth are satisfied on a sustainable basis and each person has an equal opportunity to realize his individual human potential.

### **Equitable use of resources for Sustainable lifestyles**

To ensure sustainability it is essential to make equitable use of resources for meeting the basic needs of present and future generations without degrading the environment or risking health or safety. The basis of sustainable lifestyle for the protection of environment is the three R (*Reduce, Reuse and recycle*).

**Reduce:** The best thing that we can do for the planet is to use less of it. At the heart of the environmental crisis is our consumer society. Before you buy any thing new, ask yourself the following questions.

- Is there another product which would do the same thing but more sustainably?
- Will this last for a long time?
- Do I know how this item was made?
- How it will be used and how it will be disposed off?
- Where was this made and under what circumstances?
- Are the materials used to make this renewable?

**Reuse:** With the current growing consumerist trends we are often encouraged to buy “new improved products” even if the current one can be repaired. It is better to invest in items which are durable and take care to enhance their longevity as well.

**Recycle:** Rather than throwing an item out have it recycled. Eventhough recycling is not perfect (it requires energy and the process of changing something into something else often produces by-products) it is better than sending goods to the landfill or having them incinerated. Find out what types of materials can be recycled in your area. Clean and sort your materials before putting them in the garbage.

The following is a representatice list of things that we could do in our day to day life to make it more sustainable.

### ***Energy***

- Stay at a place closer to work the work place, or work at home when possible. By reducing travel you can save money and reduce pollution.
- As far as possible walk, use cycle or public transport system.
- Carpool and combine trips.
- Maintain your vehicles well. Without the required maintenance, it can lose considerable percent of its fuel efficiency.
- Use compact fluorescent (CFL) lamps, which fit into ordinary incandescent light-bulb sockets but use far less electricity.
- Buy energy/fuel efficient appliances with smarter designs.
- Prefer rechargeable batteries, especially solar powered.
- Install solar water heaters; they're often cost-effective even in cloudy areas.
- Turn off all lights, television, fans, air conditioners, computers and other electrical appliances when they are not in use.
- Reduce air conditioning demands in the summer by installing window blinds and planting trees outside the building.
- Put on a sweater instead of turning on the heater in the winter.
- Never run machines (washing machines or dishwashers) half empty.

### ***Water***

- Install low-flow showerheads. With less water to heat, you'll save water and energy.
- Adopt rainwater in all buildings.
- Repair leaky pipes with out delay. Even small leaks can waste thousands of liters of water a year, and most can be easily repaired by replacing worn parts.
- Install low-flush toilets which save on flushing water. It saves money as well as water, by cutting utility bills and/or septic tank cleaning charges.
- Turn the water tap off when you brush your teeth instead of letting it run.
- Don't water plants during the day because water evaporates more then.

### ***Food***

- Eat lower on the food chain. Meat, eggs, and dairy products require disproportionately more land, water, and other resources to produce than they return in food value.
- Buy fruits and vegetables that are grown in your locality.
- Start a community garden in unused open space.

- As far as possible avoid fast food. The meat may be contaminated with hormones.
- Grow at least some of your food. Plant a tomato plant or greens in a pot. Nurturing the food that will in turn nurture you is a very satisfying process.
- Try to choose foods that are seasonal to your area rather than imported from long distances.
- Buy produce from a farmer's market whenever possible.
- Prefer organic produce instead of pesticide-laden produce.
- Choose not to buy foods and goods that are overpacked.
- Cut down on meat as a protein source and try to practice a fiber rich vegetarian diet.

### ***Consumables***

- Use non-toxic cleaning chemicals. Borax, vinegar, baking soda, salt, and lemon juice are a few of the many natural alternatives. Baking soda is a good inexpensive scrubber. Vinegar works fine as a coffee pot and window cleaner.
- Use non-toxic alternatives to household pesticides.
- Take a quick look at the list of ingredients in the consumables like shampoos, deodorants, soaps etc. before the purchase.
- Avoid cosmetics that are animal tested. The labels will specify this. An animal should not die in misery so you can look pretty.
- Use cloth napkins instead of paper ones.
- Limit the amount of goods you buy.
- Use pens that are refillable.
- Use gas lighters that can be refilled.
- Bring your own bags with you to the stores.
- Buy consumables in bulk, and use your own reusable containers to eliminate wasteful packaging.

### ***Waste generation***

- Make compost, or if you don't want to build your own compost, give your organic waste to friends.
- Separate recyclables from your garbage, and recycle them.
- Reuse paper bags, envelopes, etc.
- Maintain possessions instead of discarding them. With a few tools and by spending a little time you can save money, resources, and landfill space.
- Start a compost pile with your kitchen scraps in your yard or garden instead of land filling.
- Use natural composts and fertilizers instead of commercial chemicals to nurture your garden. Run-off from chemical fertilizers is a serious pollutant in our waterways and wells.
- Make sure you are recycling everything you can.
- Don't burn garbage or newspapers indiscriminately. They could release toxic heavy compounds like dioxins and heavy metals into the atmosphere.
- Recycle single-use batteries instead of throwing them in the trash, from where the dangerous metal content can leach into the waterways.

### ***General***

- Be politically active. Inform politicians of your concern for the environment. Lobby your government officials for renewable energy and better public transportation.
- Form a group in your community to discuss climate change and call for action at the local level.
- Educate people about climate change. You could write a letter to the editor of your local newspaper about energy and global warming.
- Plant shade trees on the western side of the residence to get cooling effect in summer.
- Take down your back fence. Share garden space and play areas with your neighbors.
- Substitute materials can be less environmentally benign
- Educate yourself and don't be greedy. Surf the web for current information.
- The root cause of all our environmental problems (and probably many of our social problems too) is that there are too many humans on the planet. The web of life is in a precarious position as humans push other species out.
- Choose to have not more than two children.
- Adopt children.
- Don't use antibiotics unless you absolutely must. Many disease strains no longer respond to antibiotics, in part because of overuse.
- Make sure you are practicing safe sex. AIDS is becoming the number one cause of death among young people.
- Buy clothes and materials that are manufactured by adult workers who receive a fair wage and work in decent conditions in a non-polluting factory. You must do your homework here, be persistent and ask a lot of questions. Nike and Reebok are examples of products that are not produced under just or human conditions.

### **Benefits of sustainable lifestyles**

The benefits of sustainable lifestyles include the following.

- Direct financial savings. By serving more people and serving them longer before new landfills, roads and utilities have to be built and operated, substantial financial savings are possible.
- Enhancing community environmental quality. From reduced air and water pollution to fewer problems with toxic and hazardous substances to less traffic congestion, communities will be cleaner, safer, and higher quality places to live.
- Strengthening the fabric of the community by reinforcing neighborhood relationships and enhancing the capacity of citizens to take responsibility for helping themselves and each other.
- Expanding environmental literacy and building a citizenry that is environmentally motivated.
- Increasing local government revenues.
- Achieving more effective, economical, and equitable compliance with state and central environmental regulations and requirements.
- Improving the relationship between local government and its citizens. By building active working partnerships with citizens to recycle and conserve resources.

- Building consumer demand for environmentally sustainable products and services so that it is economically profitable for businesses to meet this demand.
- Starting a process that catalyzes citizen participation in creating a sustainable community, where progress toward the interdependent goals of prosperity, social equity, environmental protection, governmental efficiency, and a higher quality of life can be sustained for the generations to come.