Abstract

The goal of the proposed "Sustainable Development Programme for Greek Islands" is to support balanced economic and social development of the Greek islands. Sustainable development should be based on the particular characteristics, potential and capabilities of each island and should respect and protect their unique environments, the local character and their cultural heritage. Today’s model of island development values increased consumption of island resources. This may be efficient for short-term profits, but is inefficient in the long-run and appears to literally be a dead-end. The current view devalues relationships and island communities and is focused on pieces rather than the whole (eg. single plants and animals, or isolated social issues such as economic growth). Islands are more than the collection of their inhabitants and their resources. They are living ecosystems and we are now beginning to realize that there are many interdependencies and interwoven systems that come together to form the whole. Sustainability is a tendency to once again consider the whole instead of specific pieces in isolation. Sustainability brings to light the connections between natural and human communities, between nature and culture. Sustainability is not at all about regressing to primitive living conditions. It is about understanding the situation of the islands and developing island communities in ways that are equitable, and that make sense ecologically and economically.

Introduction

The natural resources and the cultural heritage of the Aegean islands is very rich. However, the Aegean islands are very sensitive systems and today in great danger of being spoiled due to changing social values and over-exploitation of natural resources. Today’s model of tourism development based on «mass tourism» involves increasing utilization of natural resources which leads to problems of resource scarcity and decline of resource quality. The current trend of island development leads to the waste of natural resources, particularly of land and water, and to a quick change of traditional values of the islanders. The economic wealth of many islands today is nothing more than the richness humans have extracted from the islands.

Quite often the socioeconomic pressures for development do not consider the need of sustainability and this leads to bad management of island resources. There is an increasing concern that the current model of island development, based on increased levels of consumption of goods and services, is not sustainable on the long run. This is crucial since a sustainable situation is rarely tenable under such conditions of increased consumption and in many cases, resource over-utilization is incompatible with protection.

The majority of the Greek islands are relatively small and with limited quantities of water, and land. We can only consume so much, and expand and grow so far before the islands run out of these resources. If social limits do not first constrain the growth of the islands, then at some point ecological constraints will impose constraints. We cannot preserve nature, or freeze it in any particular state (and probably do not want to do so). The islands including their inhabitants are part of a changing and dynamic ecological system. So development is a natural and desirable process. However, development of the islands must be in harmony with the small size of the Greek islands, their local character, their cultural and social heritage, and the fragile island environment.
The goal of the proposed Sustainable Development Programme for Greek Islands is to support balanced economic and social development of the Greek islands. Sustainable development should be based on the particular characteristics, potential and capabilities of each island and should respect and protect their unique environments, the local character and their cultural heritage.

Sustainability is a tendency to once again consider the whole instead of specifics. Sustainability emphasizes relationships rather than pieces in isolation. The ecological movement has focused attention during the last century on the degradation of natural systems. Sustainability brings to light the connections between natural and human communities, between nature and culture. Sustainability is not at all about regressing to primitive living conditions. It is about understanding the situation of the islands and developing island communities in ways that are equitable, and that make sense ecologically and economically. Besides the term sustainability, there are many other words describing comprehensive and integrated approaches: whole systems design, complexity, holistic design, and many more.

**The concept of island ecology**

From an ecological point of view an island is an ecosystem with reduced in number and intensity ecological interactions with the rest of the Biosphere. True islands surrounded by sea as well as conventional islands like some mountaintops, lakes or even open-water oceanic systems correspond to this definition.

The main characteristic which identifies an ecological island is the lack of powerful stress competitors. An exciting model to explain species richness on islands has been proposed 30 years ago and is known as «islands biogeography» (Mac Arthur and Wilson 1967). According to this model, if a potential pool of colonists far exceeds the number of species that could coexist on an island, and if extinctions were random or proportional to species richness, then the island would reach a characteristic equilibrium number of species, depending on the size and remoteness of the island. Many experiments with different types of islands have shown the value of this model which is, however, not always applicable (Colinvaux 1993).

The geographical isolation of a true island together with its size determine the characteristics of the island ecosystem. Some additional features, like the age, the physical conditions etc. play also an important role. A distinction, which has to be made, is between on the one hand isolated volcanic islands, where the character of their terrestrial biota is dependent on which ever source continent or other islands have been responsible for providing the ecosystem and on the other hand islands which have been separated from continent and which have kept the whole or a part of their initial continental biota.

The property of islands to be biologically isolated can be called «ecological insularity». True islands are surrounded by sea, which protects them from abrupt changes coming from the continent. This protection is more important when the distance of the island from the continent is long enough. Remote islands have an oceanic climate which makes glacial cycles less intense and where extreme climatic events may be comparatively rare, with the exception of islands being in cyclone belt or those subject to «El Nino» events (Cronk 1997).

The property of all true islands to be protected by the surrounding sea acting as a buffer zone can be called «oceanicity».

The particular type of island stability may be regarded as a combination of calm resulting from oceanicity and low species turnover resulting from insularity. This type of stability is particularly suited to the maintenance of a particular type of diversity in ecosystems that are species poor (Cronk 1997). Specific physical conditions of different islands can contribute to the creation of additional local endemism. Therefore these ecosystems frequently have considerable biological interest in terms of endemic species or genera. Stability can be defined as the tendency of biota, their interactions and community processes to persist in a given geographical area for long peri-
Islands present a high «isolation stability», over geological time, as their biota can persist for millions of years, because of low incidence of natural perturbation (Cronk 1997).

Human intervention in island ecosystems unleashes an often catastrophic rain of extrinsic forces onto systems that are very susceptible to extrinsic perturbation (Cronk 1997). The causes of this great vulnerability, which can be called «fragility» include species poverty, small scale, historical events, etc. Consequences of species poverty are not only poorly competitive biota and existence of vacant ecological niches, but also lack of generalist predators and parasites (Cronk 1997). Consequences of small scale can be the critically small size of some populations as well as the lack of sufficient spatial refuges. Given the important vulnerability of island ecosystems, the accidental or voluntary introductions of foreign species by man can easily turn out to invasions with catastrophic consequences on local flora or fauna.

The combination of long-term persistence and fragility makes the apparent «stability paradox» (Cronk 1997), which is easily resolved when it is realized that these features are related to the same islands characteristics: Insularity and oceanicity.

The Aegean archipelagos comprises hundreds of islands which are more or less subjected to the consequences of the main island properties described above insularity and oceanicity. However, Aegean islands have also their particular ecological characteristics which are more or less specific to all of them:

- their size, with a few exceptions, is very small, thus creating a particularly simple Mediterranean ecosystem
- their distances from the continent or between them are generally small, thus heating favorable conditions for interchanges
- they have a very long and continuous history of coexistence with human civilization, thus establishing a complex system of interdependence with man.
- they have been able to support very important human populations in the past, thus indicating great possibilities of goods production in a context of rational and careful resources management.

All these features attest that Aegean islands, although they always maintain a real island character, present many differences from remote oceanic islands, where most ecological studies on islands have been developed. In particular, Aegean islands possess the properties of insularity and oceanicity in a more light version. The long-term persistence is evidently effective, although not much different from adjacent continental sites, which have not been subjected to intense human pressure. Their fragility is rather less impressive than that of oceanic islands, given their long coevolution with human population and related flora and fauna.

In addition to their common characteristics, some Aegean islands have important specific features, which are related to particular physical conditions, as for example size, volcanic origin, high altitude etc. or to particular socioeconomic conditions as for example intense tourist development, industrial or mine activity, very small or no human population etc.

The particular characteristics of the Aegean islands which concern the state of their ecosystems, but also their interrelations with man could be considered as the expression of an additional island property, named «Aegeanicity».

Sustainable island development

The natural resources of the islands are the fresh water resources, the coastal environment, the beaches, the natural areas, etc. Other island resources are related to infrastructure, built environment, energy utilization, the island economy, local culture, cultural heritage, and general aesthetics of the island. A model of island development in order to be sustainable must respect and maintain the quality of natural and cultural resources and not exploit them, (Beller et. al., 1990, Briguglio et al., 1996).
The real power of the concept of sustainability lies in its integration of economic, social, and ecological systems, previously studied and dealt with separately. Each generation is entitled to the interest of the natural capital, but the principal should be handed on unimpaired. A sustainable island society is one that satisfies its needs without diminishing the prospects of future generations. In the light of this discussion «Sustainable growth» is a contradiction in terms: nothing physical can grow indefinitely. «Sustainable use» is applicable only to renewable resources: it means using them at rates within their capacity for renewal.

Today's model of island development values increased consumption of island resources. This may be efficient for short-term profits, but is inefficient in the long-run and appears to literally be a dead-end. The current view devalues relationships and island communities and is focused on pieces rather than the whole. It does not look at island habitats and communities in their entirety. It is not enough to simply concern us with single plants and animals, or isolated social issues such as economic growth. Islands are more than the collection of their inhabitants and their resources. They are living ecosystems and we are now beginning to realize that there are many interdependencies and interwoven systems that come together to form the whole. Social and environmental programs need to protect and restore habitat, and not simply protect individual species or solve individual problems.

Problems generated by humans in many islands are increasing in number and complexity and are now demanding more of our attention. There is evidence to suggest that we are altering the environment and culture of the islands significantly enough to endanger and threaten a healthy future for humans and many other life forms. These alterations not only degrade the environment but they also alter the social fabric and the culture of the islands which took aeons to develop. In giving attention to the social fabric we are valuing such intangible things as trust, understanding, and commitment, and saying they are as important as other more visible and quantifiable concerns like buildings, streets, and economic growth.

The degradation of natural systems in the islands is also linked to the breakdown of social systems. In both cases the destruction and simplification of communities threatens the continued viability and long-term health of island communities. Human communities in the more touristically developed islands are suffering from an increased rate of change and disturbance. In turn, humans are inflicting ever more damage on their island communities.

Sustainability depends on the diversity found in complex, healthy communities. However, the island communities are continuously being "simplified." The current economic model of island development encourages environmental destruction (waste and pollution) and cultural destruction, leading to both ecological and cultural simplification. Simplification is often done in the name of short-term efficiency and profit but this creates great long term problems. Similar to simplification taking place in the ecological systems, we see a homogenization of human communities and island cultures (McDonalization).

Sustainability implies an approach to problem solving and design that is not only comprehensive but, even more importantly, integrated. Integrated planning in this sense does not necessarily mean more planning, but more effective planning. While classical economics views ecology as a separate world from the economy, sustainability sees the economy as an open subsystem within the finite and physically closed ecosystem of the earth. Bringing the ecological into the economic is one of the challenges of new economic theory. By only addressing concerns for ecology, or economy, or equity, and not the three of them together, we will likely continue to only come up with partial solutions, and solutions which are often in conflict with each other.

The goal of the proposed Sustainable Development Program for Greek Islands is to support balanced economic and social development of the Greek islands. Sustainable development should be based on the individual characteristics, potential and capabilities of each island and should respect and protect their unique environment, the local character and their cultural heritage. The goal is not just to come up with great lists of things to do, but to develop a perspective and a framework that helps us to see the big picture and value, and work with the relationships between people and issues in the islands.
Integrated management of natural resources of islands should be based on protection rather than correction policies. The quality of environmental resources strengthens the local identity and competitiveness of the islands and is of paramount importance to island sustainability.

The technological perspective generally supports technical and managerial strategies as solutions to our problems. Embracing technological solutions to sustainability problems often includes the beliefs that economic growth is necessary and desirable, and that science and technology will solve our problems and find substitute resources. However, today's problems of the islands are very complex and technology alone is unable to address them in a satisfactory manner (Orr, 1992). An alternative «ecological view» requires changes in politics and values, as well as in technological systems. Proponents of ecological sustainability more often recognize limits, in terms of physical resources, and also in terms of our ability as humans to manage and control the earth with technology.

We believe that both technological and ecological views are necessary; we need technology for the short-term to help stabilize the trauma that island systems are now in, and an ecological perspective for the long-term to modify our values and behavior. Modern technological tools can be very useful in developing an effective management scheme depending on the scale and complexity of the islands. Examples of such tools are systemic analysis, analysis of consequences, economic tools, socioeconomic indices, development of studying and observation systems, development of networks for dissemination of information, etc.

**Measures and commitments for islands belonging to the network**

The islands participating in the network must follow some measures and action plans that will identified by the program depending on the specific characteristics of each island. Based on the agreements of the 1st European Conference on Sustainable Island Development» (Minorca, 1997), an integrated sustainable development plan for the islands requires the following actions:

- Recording the current state of the island resources and the corresponding trends of resource utilization
- Definition of island priorities and identification of the basic areas of action
- Determination of specific actions that should be implemented and specific objectives for each area of activity
- Local acceptance of the project goals and sustainable development plans
- Guidance for the application of plans

A preliminary list of suggested measures and action plans for the islands participating in the network consists of the following measures (see agreements of the «1st European Conference on Sustainable Island Development», Minorca, 1997),

- Development of an integrated management system that can foresee and avoid unacceptable changes.
- Development of methods for observation of consequences and changes.
- Introduction of a new philosophy regarding tourism development so that tourism should become an ally and not an enemy to sustainable development.
- Protection of traditional economic activities besides tourism. Protection and development of local based small size enterprises.

According to the above mentioned conference we need to focus policies and efforts to the solution of particular problems characterizing the islands such as education, economy (development of new working positions), health services, drinking water, waste disposal, energy, social and cultural life, etc. The structures must be steady regarding measures, legislature, and practices as well as development of cooperation between authorities, public and industry/tourism.
The islands participating in the sustainable island network must follow some commitments and actions that will be defined by the programme. Below follows an initial list. This list will be expanded and adapted to each participating island depending on their particular needs.

• A new model of tourism development that respects the local environment and cultural heritage of the islands must be agreed between all parties involved in tourism and the local societies of the participating islands. Alternative forms of development with lower impact on the islands environment such as ecotourism, may be a more appropriate model for the Aegean islands. In some cases the best strategy for conservation could well be minimal development or no development at all. If so, the political will must be built to forego the greater financial returns from resource utilization. Moving to a sustainable tourism model requires the development of special tools for design and application of special indicators for observing tourism development. This involves the creation of ecological and quality signs for tourist services and promotion of handbooks of responsible contact for the tourist sector as well as for the visitors.

• There should be a diversification of economic activities of the participating islands. The role of small size enterprises must be supported with economic and administrative measures. The cooperation between enterprises of island regions as well as development of networks of enterprises of similar specialties must be supported. Multiple economic activities in various sectors that are based on «wise» management of natural and cultural resources, promotion of strategies that minimize environmental impacts and increase participation of renewable energy resources and avoiding dangerous specialization, must be encouraged.

• Information must be transmitted to the islanders and authorities of the participating islands towards better knowledge and understanding of problems and the situation. This requires the development of new courses in schools, application of restrictive measures as well as technical and administrative measures towards protection and better use of resources. Among the goals of the programme is the development of a focal point using telematics in each major island or island complex where to present and discuss current issues and future plans towards sustainable development. The authorities as well as the island citizens should be able to participate in this network.

• The role of new technologies must be explored and be introduced where they can assist the participating islands in their goal for sustainability. For example new technologies can be useful to utilize renewable resources (solar, wind energy), while telematics can be used in the public and private sector for reducing isolation of islands. New technologies can be used for recycling wastes towards as well as for better management of water resources, including design of new projects and reduction of water consumption. Any technological solution must be adapted to the scale and character and must be in agreement with the physical and cultural heritage of the islands. Technological solutions must reduce the pressures on the critical resources, must reduce wastes, utilize renewable resources and offer to the local communities higher quality of services.

• The islands participating in the network must develop policies and mechanisms for the rational use and savings of energy and introduce technologies which are based on renewable sources of energy aiming to a larger market share. A guide of good contact regarding energy saving must be promoted among locals and visitors.

If we accept the idea that sustainability is an integration of ecological, economic, and cultural concerns within and among island communities, and over time, then we need tools that will help us to better understand these dynamics and complexities. Indicators provide evidence that a plan or project is moving us toward or away from desired conditions. Indicators must evaluate both objective and subjective information if they are to be effective. The process of creating and using indicators is in itself a useful planning tool. Indicators ideally do more than merely provide information. They are intended to inspire and provoke action.
Indicators of sustainability measure quality of life, not just quantity. They evaluate long-term economic, ecological, and social health of a community. They evaluate short-term political acceptability of plans and programs and are based on commonly accepted data or information (objective in nature). In the case of the Greek islands indicators should be created at the community, island and island network level.

Discussion and conclusions

Sustained physical growth and expansion on islands with limited resources and space is impossibility. Therefore the aim should be the islands to develop qualitatively without growing quantitatively.

Sustainability requires us to think comprehensively about places and systems as well as across time and generations. Sustainable planning calls for a valuing of both objective and subjective information. At the island level, for example, "objective" analysis might include evaluating energy and material flows. This study would complement a "subjective" study of the inhabitants' needs, wants, and aspirations. At the island level, an objective look at population and land use trends could complement a subjective survey of island people hopes and fears.

Individuals acting alone are unlikely to possess the wisdom and ability to decide and plan for entire communities. Sustainable solutions are more likely to be created by the creative and diverse interests of an island community. The different people of an island community all have pieces of the answer, and their ideas and energies must be brought together to create the whole picture. Community decisions tend to be creative because they are smaller-scale and use local knowledge. Community-based institutions mobilize local people and resources, and, ideally, build cooperation, community strength and identity. People will make decisions to live more sustainably only when they feel that it is in their interest. A truly sustainable island community will depend on understanding and active participation of its members. Only community members can ultimately make the decisions and implement all significant community plans and projects. People need to participate in the development and use indicators if they are to be effective.

The proposed program will suggest a set of indicators. Integral to sustainability is the idea that quantitative growth must be balanced with an appropriate emphasis on qualitative development. Therefore our exclusive reliance on economic indicators must be replaced with more comprehensive indicators that include social, ecological, and economic development. Someday, people in the islands will create their own indicators to be specific to local challenges and opportunities. These locally developed indicators should be updated and publicized on a yearly basis.

Ignorance and disenfranchisement are major barriers to sustaining any community. Public education coupled with community empowerment may be the single most important aspect of achieving sustainability. The proposed island network will help to disseminate information, authority and assessment among the islands on the network. In a sense the islands of the network will be interacting and helping each other based on their experiences.

The future has always been uncertain and environmental disturbance and constant change are fundamental laws of nature. The ability to cope with change depends on the health of the system as a whole. As the health of social and ecological communities deteriorates, their resilience and ability to deal with change and disturbance is lessened.

Sustainability is about change and development. It's not about a static, end-state of perfection. It's not about absolutes but about working to make things tomorrow relatively better than they are today. As with democracy, sustainability is a process. We need to find ways of integrating sustainability into the lifestyles of the islanders, and ways of continuously pursuing and maintaining it.
References


