

Toward a shared vision of Galapagos: the archipelago as a socioecological system

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*"In moments of crisis imagination is more
important than knowledge."
Albert Einstein*

Galapagos at a crossroads

Galapagos under threat, Galapagos in crisis, Galapagos at risk! In recent years we have become accustomed to reading, relatively frequently, this type of headline in the popular press, as well as in scientific articles, evaluations of the conservation status of Galapagos carried out by international organizations, and even in an executive decree of the Ecuadorian government.

What is happening? How is it possible that we have arrived at such a situation in Galapagos—one of the most legally protected places on the planet and where increasing amounts of human, technical, and financial resources have been invested in recent years?

There is no question that we must preserve Galapagos. That is the intent of current governmental policies, laws, and planning efforts. However, in spite of the notable conservation efforts of recent years, a shared vision of how and why we should conserve Galapagos does not exist. While most stakeholders envision conservation and sustainable development as the ultimate goal of their activities, each one acts according to their own vision of what the archipelago is and what it means to the local population, Ecuador, and the world. Efforts to build consensus among stakeholders have been



made, but they have not addressed the deep differences in opinion that exist and the reasons for these differences.

The result is that the archipelago continues to be enveloped in a profound socioecological crisis, reflected in the exponential growth of critical variables (population, number of tourists, exotic species, number of vehicles, energy consumption, etc.) that threaten its sustainability. The recent decision of UNESCO to declare Galapagos a World Heritage in danger underscores the current critical situation.

Rather than as a potential catastrophe, the current situation should be seen as a "window of opportunity" to learn from past mistakes and to break the resistance to change. Recognizing that a problem exists is the first step in any transformation process. In this sense the current situation can be a true opportunity, perhaps the last, to reorient the system towards a more sustainable model.

In 2007, the Ecuadorian government publicly recognized the profound changes needed in Galapagos when it declared Galapagos at risk and its conservation and the environmental management of the archipelago a national priority. But the question remains: What do we change? The Management Plan of the Galapagos National Park (GNP) recognizes that an enormous effort has been invested in the last three decades to attack the effects and not the real causes of problems (GNP, 2005). To be able to effectively change the current path of Galapagos we must look at the archipelago from a different perspective, one that will permit the identification of the real causes of the crisis.

In 2007 and 2008, the GNP initiated an interdisciplinary and participatory research project to develop a socioecological model for the archipelago that would provide the foundation for the development of the kind of shared vision called for by various regional planning documents. Key to the success of this project will be the clear identification of the primary causes of current problems and the willingness to confront the crisis. Some of the results of the project are presented here. The objective of this article is to provide a theoretical and con-

ceptual basis for future work and to stimulate debate over which management model is most applicable to the archipelago.

Galapagos as a system: everything is interrelated

Simply put, a system is an entity formed by interdependent units that function as a whole. In addition, systems have emerging properties that arise from the interactions of their components. From a system-based perspective, the "whole" is much more than the sum of its parts. As such, a system cannot be understood nor managed efficiently if the flow of energy, materials, and information that connect and bind together the different components is unknown and unmanaged. Except for a few recent attempts to analyze the problems of Galapagos from an integrated perspective (MacFarland and Cifuentes, 1996; GNP, 2006; Watkins and Cruz, 2007; González et al., 2007), the predominant perspectives of the archipelago have been sector-based rather than system-based.

In Galapagos, the different components of the system are tightly linked and interconnected by biophysical, economic, and sociocultural flows that operate at different levels (Figure 1). The principal flows entering the system on a national level are materials and energy from the continent, as well as people and exotic species. On an international level there are notable financial and information inflows, which are important when defining and explaining the current lifestyle of Galapagos residents.

In terms of outflows from Galapagos, there are enormous financial flows from the islands on both the national and international levels, as well as information outflows related to the scientific value of Galapagos.

The following diagram depicts Galapagos as an open system, dependent on the outside world. The archipelago appears as an importer of human capital, energy, and materials, and as an exporter of financial capital and information through tourism and science. It also

shows Galapagos as a very fragile system given its elevated dependence on the outside world. This vulnerability is particularly worrying in the context of global

change ¹. It is clear that solutions to current problems in Galapagos must be found at various levels.

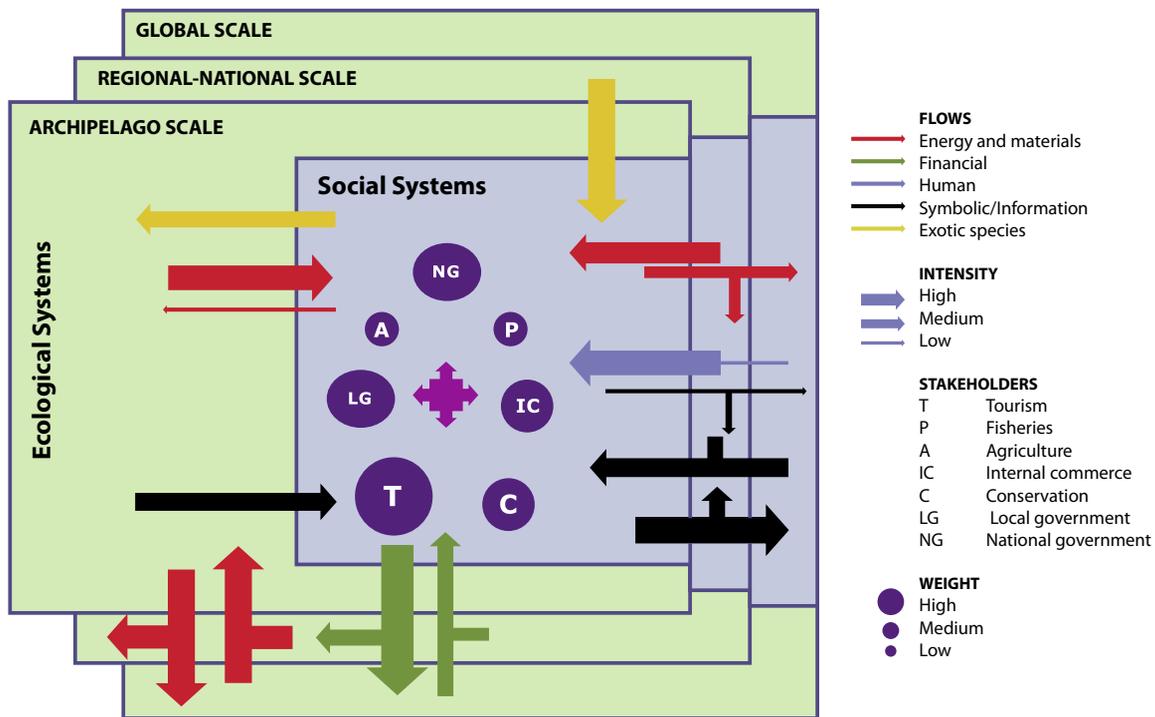


Figure 1. Depiction of the archipelago as an open system that is highly vulnerable to disturbances, primarily from the outside world.

Maintaining the ecological and evolutionary processes of Galapagos and its biodiversity and unique ecosystems is highly dependent upon the isolation that has characterized the archipelago during most of its history (Bensted-Smith, 2002). However, the human population that lives in the islands demands an increasing flow of goods and services from outside the system, thus increasing its vulnerability. Ensuring the coexistence of species and ecosystems of the archipelago with human society is not an easy task (Ospina, 2006).

Galapagos as a socioecological system: ecosystems and human welfare

One of the elements that may help explain why policies to promote sustainability in

Galapagos have been largely unsuccessful is the belief held among many that human society and nature conservation are not sufficiently linked so as to require integrated management. The prevailing view has been that nature and society can be administered more or less independently from one another and, as long as both camps demonstrate mutual respect, a balance can be struck between conservation and development.

Galapagos is profoundly anchored in and inseparable from the insular and marine ecosystems with which they interact and depend.

Reality shows that the socioeconomic system of Galapagos is profoundly

¹ Emerging process related to environmental changes generated by human activity that are modifying essential biogeophysical processes that determine the functioning of our planet (Duarte, 2006).

anchored in and inseparable from the insular and marine ecosystems with which they interact and depend. The social systems are part of an even larger system; they exist and function as part of a socioecological system or socioecosystem.

From this perspective, ecosystems and society should be conceptualized and managed as a single, integrated unit. This form of thinking and acting will help to break down the artificial barrier that has existed between conservation and development. It will focus interventions on the management of the interrelationships and processes that link the human and natural systems, rather than on separate components of the system.

The conceptual model developed to understand Galapagos as a socioecological system (Figure 2) highlights the tight, bi-directional links that exist between the social system and natural capital. Natural capital is understood as insular and marine ecosystems that maintain their ecological integrity (structure, dynamics, functioning, and capacity for self-organization) and which are jointly capable of generating a

combination of essential services for human development at distinct spatial (regional, national, and international) and temporal (present and future) scales.

The ecological integrity of the natural system depends largely on the conservation of the structure and functioning of the insular and marine ecosystems of the archipelago. These, in turn, depend on biodiversity and the maintenance of evolutionary potential and essential ecological processes such as primary production, the water cycle, nutrient cycles, and ocean current systems.

The dynamics of the social system are sustained through diverse cultural, socio-political, and economic processes driven by a series of actors that interact with one another and with the natural system in complex ways. These interactions are governed by relationships that are partially independent from the functioning of ecosystems, such as balance of power among stakeholders, the interplay between material interests, and the cultural environment in which they take place.

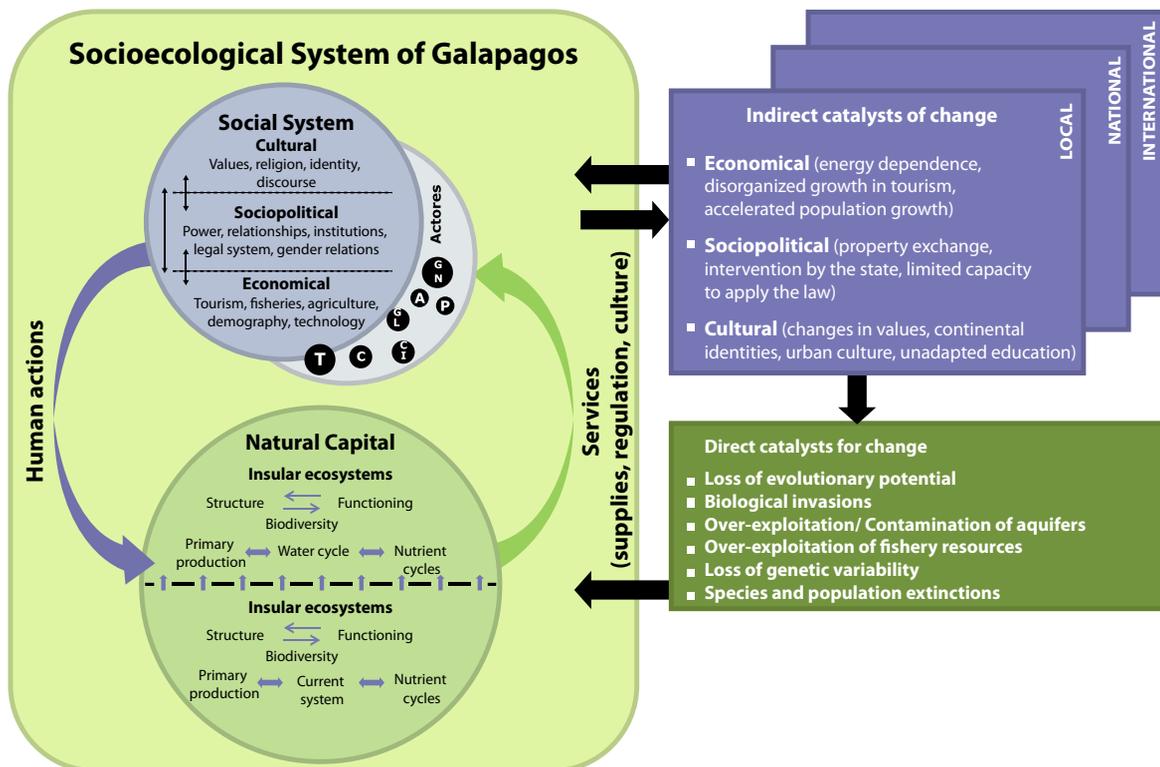


Figure 2. Viewing Galapagos as a socioecological system permits an understanding of the dependent relationships between the social system and insular and marine ecosystems, and helps to identify the real causes of current problems.

Changing paradigms: a new form of thinking and acting

The rapid and intense changes that Galapagos has experienced in recent years have divided the islands into two camps: conservation and development. Management of the protected areas has tried to minimize the impacts of human activities that could affect natural ecosystems. This has created an opening for various processes and socioecological relationships, pitting protected areas against inhabited zones.

We now know that this approach will not conserve the ecosystems and biodiversity of Galapagos. No matter how much one expands the limits of the protected areas, social interactions and indirect catalysts will continue to affect them because those who live in Galapagos depend on the protected areas and will continue to use, change, or alter them. At the same time, certain biogeophysical processes that are essential for the ecological integrity and the resilience of Galapagos ecosystems strongly depend on areas located outside the protected areas.

To analyze the current situation of the archipelago and be able to design innovative management models that will reverse current trends and solve the present crisis, it is imperative to understand and look at Galapagos differently. The local population must be considered part of this complex socioecological system, a system whose primary processes (primary production, water cycle, nutrient cycles, current systems, etc.) must be maintained if Galapagos biodiversity is to be conserved and social welfare enhanced.

Analysis of the principal catalysts of change, those that influence the dynamics of the system and represent the root cause of the present crisis, clearly shows that current problems are not rooted in the natural system but rather in the socioeconomic and cultural systems.

Tourism provides a good example of the complex and dynamic socioeconomic interactions now underway in Galapagos. Various studies have highlighted the fact that tourism is the principal economic

activity in the archipelago, driving, catalyzing, and determining the dynamics of the rest. Tourism drives immigration and is the principal factor opening the province to the outside. Although tourism produces certain direct impacts on the natural system (waste and pollution, among others), its principal impacts are indirect and affect the entire socioecological system through an economic model based on unlimited growth, increasing consumption, and the accumulation of material wealth.

To reorient Galapagos toward truly sustainable models of development, management policies should focus on changing the current nature of the local economy. They should address the internal balance of power and relationships with external economic interests. The strength of the current cultural, economic, and political power bases make it difficult to develop a shared vision of the future of Galapagos.

It is clear that the ecological systems in Galapagos require urgent and innovative measures to be able to adapt to disturbances and changes produced by human activities and the progressive loss of geographic isolation. One of those measures is an explicit recognition in planning and management that the social systems in Galapagos are a dynamic and influential force and that they must be evaluated and restructured. If intellectual, social, and cultural capital are not systematically identified and engaged in long-term management objectives, a progressive loss of the natural capital of Galapagos will ensue. This loss in biodiversity will have profound effects on the quality of life in Galapagos with inevitable and irreversible consequences.