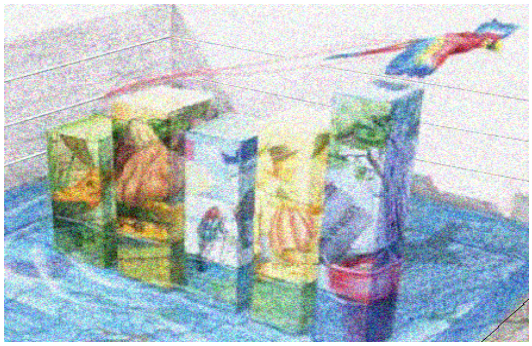
DOCUMENT OF INVESTIGATION FOR ECONOMISTS' MEETING OF BOLIVIA 2011



SITUATION AND PERSPECTIVES OF THE BIOECONOMY IN BOLIVIA.

Lic. Angela Alizares Revollo[1].

a. Abstract

The Bolivian territory represents scarcely 0,2 % of the world surface. His forests reach 3,5 % of the forests of the World. Nevertheless, in the country they are between 35 and 45 % of the whole biological world diversity. For his gradient altitudinal, that ranges between 90 and 6.542 msnm, Bolivia is one of eight richer countries of the world in biological diversity. His territory understands 4 biomasses, 32 ecological regions and 199 ecosystems. Bolivia, with natural so immense wealth, has a new opportunity of economic development of the hand of the biotrade.

The Conference of the United Nations On Trade and Development (UNCTAD) codes in 915.000 million dollars the size of the world market for the products of the biotrade, is of highlighting that the bio ones - ***entrepreneurships*** *have a high value as for the generation of employment refers, as well as the synergy between communities, companies and Government, to achieve a sustainable utilization of the native resources, to develop the country and to improve the situation of poverty, which in the main, there cross the rural and indigenous communities. But as constructing the Green Bolivian Economy, under limits Krugmanianos and doing a study to Georgescu-Roegen there is approached the question of the costs and the economic instruments necessary for the sustainable development of Sector Bioeconomy sector.*

b. Key Words : Biotrade, Sustainable Development, conservation of the Biodiversity, Sustainable Development, Economic Politics.

c. Classification JEL : Q57 ;Q56;P48

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"Because the law of entropy, between the economic process and the environment there is a dialectical link. The economic process changes the environment irrevocably altered and, in turn, for the same change also irrevocably .. ". *Nicholas Georgescu~Roegen, 1977.*

Artist :José Rodriguez Sánchez, cochabambino;

Introduction

Nature provides human society with a vast diversity of benefits such as food, fibres, clean water, healthy soil and carbon capture and many more. Though our well-being is totally dependent upon the continued flow of these "ecosystem services", they are predominantly public goods with no markets and no prices, so are rarely detected by our current economic compass. As a result, biodiversity is declining, our ecosystems are being continuously degraded and we, in turn, are suffering the consequences.

The world has already lost much of its biodiversity. Recent pressure on commodity and food prices shows the consequences of this loss to society. Urgent remedial action is essential because species loss and ecosystem degradation are inextricably linked to human well-being. Economic growth and the conversion of natural ecosystems to agricultural production will, of course, continue. We cannot - and should not - put a brake on the legitimate aspirations of countries and individuals for economic development. However, it is essential to ensure that such development takes proper account of the real value of natural ecosystems. This is central to both economic and environmental management.

Most biodiversity and ecosystem benefits are public goods that have no price. There are different approaches for solving this problem. Notably, we can adopt policies that reward preservation of the flow of these public goods, or we can encourage "compliance markets" which attach tradable values to the supply or use of these services. New markets are already forming which support and reward biodiversity and ecosystem services. To be successful, they need the appropriate institutional infrastructure, incentives, financing and governance: in short,

investment and resources. In the past, the state was often considered solely responsible for managing ecosystems. Now it is clear that markets can also play their part - often without drawing on public money.The fundamental requirement is to develop an economic yardstick that is more effective than GDP for assessing the performance of an economy. National accounting systems need to be more inclusive in order to measure the significant human welfare benefits that ecosystems and biodiversity provide. By no longer ignoring these benefits, such systems would help policy makers adopt the right measures and design appropriate financing mechanisms for conservation.

1. THEORY OF BIOECONOMY

The Bioeconomy or biological Economy offers a new epistemology to investigate the socioeconomic system in association with the biological system as a whole, and thus study the nonlinear interactions among its components and not just between the characteristics of individual components. We have developed interdisciplinary holistic science of bio-economic response to the incremental advances of the other disciplines of economy-environment (Natural Resource Economics, Environmental Economics, Ecological Economics) through which have been investigated individually and separately the pathologies of capitalism and its industrial system. The main objective of the bioeconomy is a bridge between empirical science of biology and science and literature of economics to end the disunity and separation of "the two cultures."

The bioeconomy represents a fundamental change in our ideology in all that relates to socio-economic, biological, and ethical. The bioeconomy is an effort to expand the discipline of economics to the mother of the sciences, biology, and provide a firm anchor

in their field of empirical research in addition to providing predictive power. It is the science determines the threshold of socioeconomic activity that could be used for a sistemabiológico without destroying the conditions necessary for regeneration and hence its sustainability. The mantra of Bioeconomics is outsourcing privatize the profits but the costs arising out of capitalist enterprise in contrast to neoclassical economics (Ecological Economics) to externalize costs and internalize profits.

To alleviate the huge burden of poverty that hangs over humanity will be necessary develop a new socio-economic company who can do it with minimal suffering to the people, with minimal damage to the environment and less damage to biodiversity and while maintaining their ability to regenerate. In other words, a socioeconomic activity that works within the bearable capacity of the planet and leave the smallest footprint possible biological. What is proposed is a socio-economic activity based on interdisciplinary holistic science of the bioeconomy that meets these objectives through cooperation, solidarity, fraternity and conservation. That is, a company that gives so much importance bioeconomic and social capital and capital biological capital Money.

BIOECONOMY OF GEORGESCU ROEGEN

To understand this theory we must know these importants sources:

LAWS OF THERMODYNAMICS

The laws of thermodynamics are based on physical rules that govern the behavior of

matter and energy.

• First law of thermodynamics

This law is also known as the law of conservation of energy. It states that matter and energy can not be destroyed or created.

• Second Law of Thermodynamics

This law is also known as the law of entropy. It states that while there is no external energy sources entropy always increases.

ENTROPY

Entropy can be understood as a measure of the unavailability of material or energy

The universe is constantly getting more disorderly and energy and matter are less available for use. This second law of thermodynamics states that entropy (defined as a relative index of the unavailable energy in an isolated system) is rising steadily.

All the physical, natural and technological occur so that the availability of energy involved decreases or, in other words, all physical processes occur in such a way that the entropy of the universe increases.

IRREVERSIBLE PROCESS

The laws of thermodynamics state that energy contained in the materials or driving force is not destroyed by the use (first law of thermodynamics), but is degraded and dispersed (second principle).

• Example

When you burn a piece of coal, its energy content is not reduced chemical increases (first law). However, the energy is dissipated as heat, smoke and ash, so that humans can no longer use it. Thus, this energy has become inaccessible (second law).

This is an irreversible process that no force could reverse in the absence of higher energy costs. Theoretically, substances dispersed can be retrieved and recombined, but at the cost of production of entropy, the higher the greater the dispersion is to be reversed. The scattered energy can not be recycled, except spending more energy than it would win a hypothetical recycling.

NATURE AND ECONOMIC PROCESS

What do we learn the laws of thermodynamics with reference to the economy?

1. THE FIRST LAW: QUANTITATIVE ASPECTS

All economic activity uses energy and materials. The first law of thermodynamics tells us that economic activity can not create or destroy matter or energy. What makes the production process is to absorb and expel energy and matter. This leads to a rethinking of the concept of "production".

2. THE SECOND LAW: QUALITATIVE ASPECTS

In terms of the second law, economic activity can be understood as a process of using low-entropy material (minerals, energy), they just finally transformed into high-entropy material. The difference between what goes into the economic process and what comes out of it is qualitative.

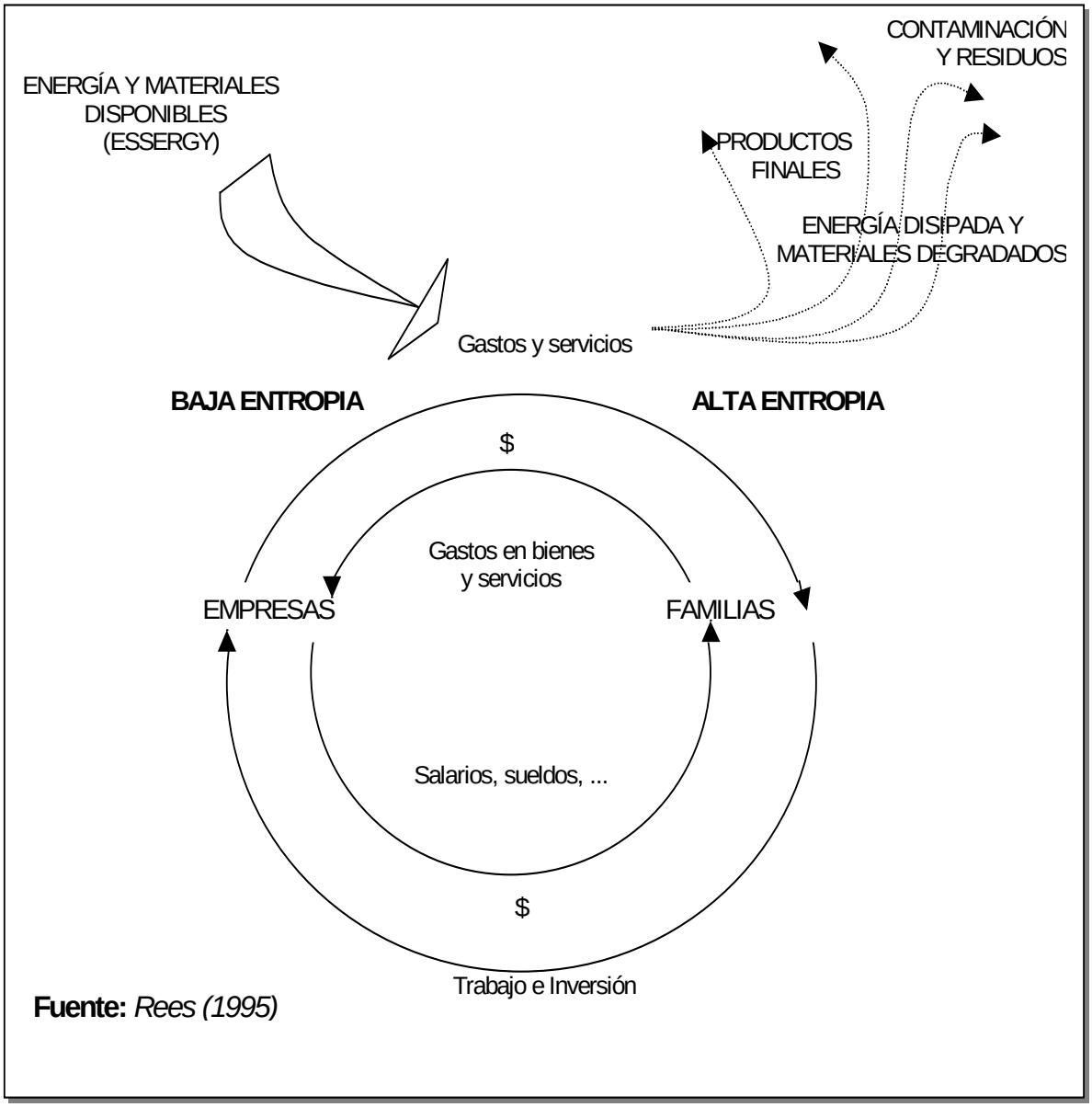
According to this view, the breakdown of the energy produced by all economic activity involves us in the sense of intergenerational responsibility. Our current development inevitably affects economic activity and development of future generations.

a)Transflujo

Transflujo is called (or throughput) to the flow of low entropy resources. This process begins in nature (inputs), then these resources are influenced by changes through the production and consumption to once again return to nature as waste (products).

In the final phase of resources (as waste) accumulate in nature and some will aprenhendidos by bio-geochemical cycles (cycles characterized by long duration of hundreds to thousands of years) to be reconstituted by absorbing solar energy low-entropystructures being useful to the economy again.

Esquema 2.1.: El transflujo lineal de materia y energía



Fuente: *Rees (1995)*

1.VALUATION OF BIODIVERSITY

The approaches of economic and environmental economies with regard to the appraisal of biodiversity are compared within the framework of sustainable development, through documentary research. The results indicate that the environmental appraisal methods collect a minimal portion of the value of goods andservices associated to biodiversity and, when applied, the needed *assumptions are grossly arbitrary. According to the perspective of ecological economics it is concluded that any appraisal methodology should include information from other fields, based on systems of values, so as to achieve an adequate interaction among socio-economic and ecological systems to warrant a sustainable management of biodiversity.*

The economic value along the ecological and scientific are the cornerstones to make use versity. Importantly, the no economic value an affair for all decisions and not represents only one of factors involved decision-making process.

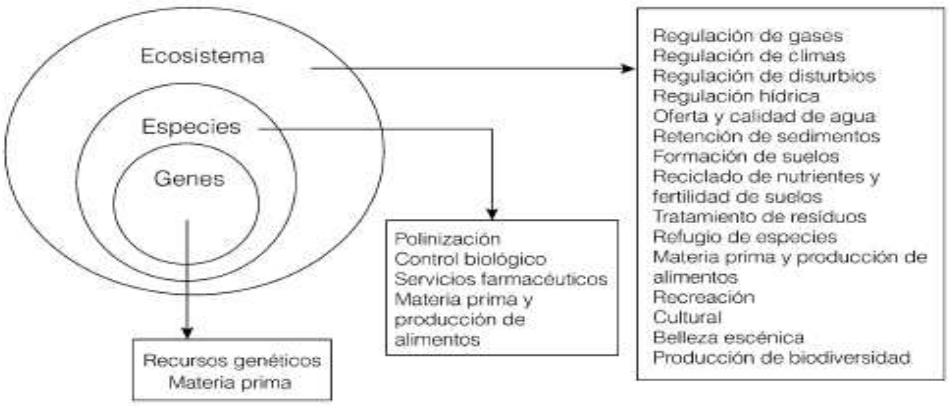


Figura 1. Estructura analítica para los servicios que ofrece la diversidad biológica al sistema económico y social.
Fuente: Adaptada de Barrantes (2001).

2. BIODIVERSITY AND ECOSYSTEMS TODAY

Historically, nature's role as the nurturer of human society was accepted as a given, and the "maternal" image of nature abounds in rituals, epics and beliefs across all societies and times.

Over the last half century however, the intricate relationship between human wealth and welfare and biodiversity, ecosystems and their services is increasingly being understood in ecological and economic terms. Our knowledge, of the many dimensions of this relationship is improving fast. At the same time, we are recognizing increasing natural losses - worsening environments, declining species. While there is some understanding that these many phenomena are in some way connected, there is at the same time an expectation that "normal service" will soon be resumed. There seems to be little appreciation of the many dimensions of biodiversity loss, or the connections between biodiversity loss, climate change and economic development Humanity receives countless benefits from the natural environment in the form of goods and services (generally grouped under the collective title of ecosystem services) such as food, wood, clean water, energy, protection from floods and soil erosion (see Box 1.1). Natural ecosystems are also the source of many life-saving drugs as well

as providing sinks for our wastes, including carbon. Human development has also been shaped by the environment, and this interlink age has strong social, cultural and aesthetic importance. The well-being of every human population in the world is fundamentally and directly dependent on ecosystem services.

• In the last 300 years, the global forest area has shrunk by approximately 40%. Forests have completely disappeared in 25 countries, and another 29 countries have lost more than 90% of their forest cover. The decline continues (FAO 2001; 2006).

• Since 1900, the world has lost about 50% of its wetlands. While much of this occurred in northern countries during the first 50 years of the 20th century, there has been increasing pressure since the 1950s for conversion of tropical and sub-tropical wetlands to alternative land use (Moser et al. 1996).

• Some 30% of coral reefs - which frequently have even higher levels of biodiversity thantropical forests – have been seriously damaged through fishing, pollution, disease and coral bleaching (Wilkinson 2004).

• In the past two decades, 35% of mangroves have disappeared. Some countries have lost up to 80% through conversion for aquaculture, overexploitation and storms (Millennium Ecosystem Assessment 2005a).

• The human-caused (anthropogenic) rate of species extinction is estimated to be 1,000 times more rapidthan the "natural" rate of extinction typical of Earth's long-term history

(Millennium Ecosystem Assessment 2005b).

We are consuming the world's biodiversity and ecosystems at an unsustainable rate and this is already starting to have serious socio-economic impacts. If we are to find solutions to the problems we face, we need to understand what is happening to biodiversity and ecosystems and how these changes affect the goods and services they provide. We then need to look at the way we can use economic tools to ensure that future generations can continue to enjoy the benefits of these goods and services

.BIODIVERSITY, ECOSYSTEMS AND HUMAN WELFARE

Today's global consumption and production patterns are underpinned by ecosystems around the world. Many different types of policy can affect the resilience of natural as well as human-modified ecosystems. From transport to energy, agriculture to cultural well-being, policies and actions can have many unintended consequences. As demonstrated by the Millennium Ecosystem Assessment (2005a), the impacts of cumulative pressures on ecosystems may not be felt for many years, until some tipping points are reached leading to rapid non-linear changes. We begin this chapter with selected examples that illustrate the wide range of effects, from food to health.

Biofuels generate much debate, Bioenergy can play an important role incombatingclimate change, specifically if biomass is used for heat and electricitygeneration.However,biofuelsalso are another source of competition for scarce land, and the scale of potential land conversion for agro-fuels is extraordinary. The International Monetary Fund reports that"although biofuels still account for only 1.5% of the global liquid fuels supply, they accounted for almost half of the increase in

consumption of major food crops in 2006-2007, mostly because of corn-based ethanol produced in the US". Reports indicate that this pattern could be replicated elsewhere in the world. But, why not Biomass of since the garbage.

GROWTH AND DEVELOPMENT

Population growth, increasing wealth and changing consumption patterns underlie many of the trends we have described. Unsustainable resource use has been evident in the developed world for many years. The ecological footprints of Europe, the United States of America and Japan are much higher than those of developing countries. And the emerging economies are catching up. India and China both have ecological footprints twice the size of their "biocapacities" (Goldman Sachs 2007) - the extent to which their ecosystems can generate a sustainable supply of renewable resources.

IMPACTS ON THE POOR

A striking aspect of the consequences of biodiversity loss is their disproportionate but unrecognized impact on the poor. For instance, if climate change resulted in a drought that halved the income of the poorest of the 28 million Ethiopians, this would barely register on the global balance sheet - world GDP would fall by less than 0.003%.

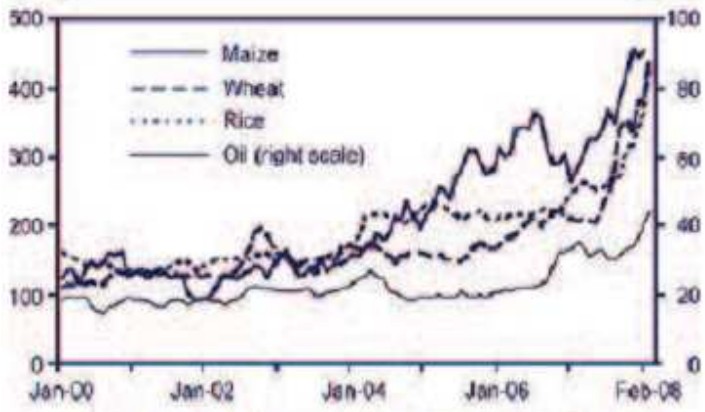
The distributional challenge is particularly difficult because those who have largely caused the problems - the rich countries - are not going to suffer the most, at least not in the short term.

The evidence is clear. The consequences of biodiversity loss and ecosystem service degradation - from water to food to fish - are not being shared equitably across the world. The areas of richest

biodiversity and ecosystem services are in developing countries where they are relied upon by billions of people to meet their basic needs.

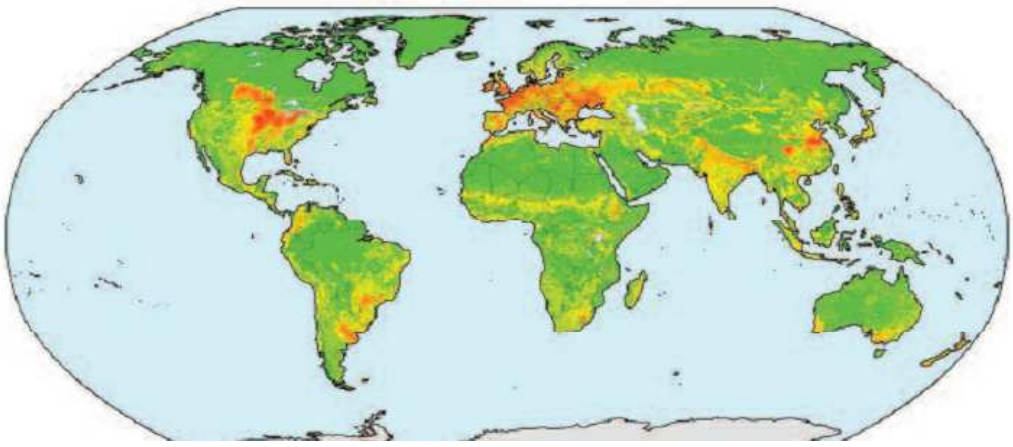
Yet subsistence farmers, fishermen, the rural poor and traditional societies face the most serious risks from degradation. This imbalance is likely to grow. Estimates of the global environmental costs in six major categories, from climate change to overfishing, show that the costs arise overwhelmingly in high- and middle-income countries and are borne by low-income countries (Srinivasan et al. 2007).

Figure 2.1: World commodity prices, January 2000-February 2008 (US$/tonne)

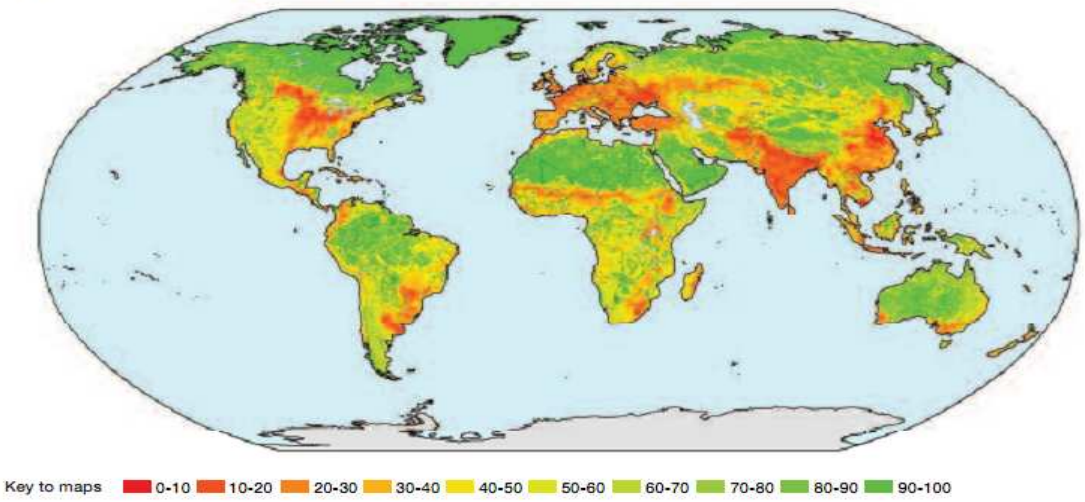


Source: FAO International Commodity Prices database, 2008; IMF World Economic Outlook database, 2007.

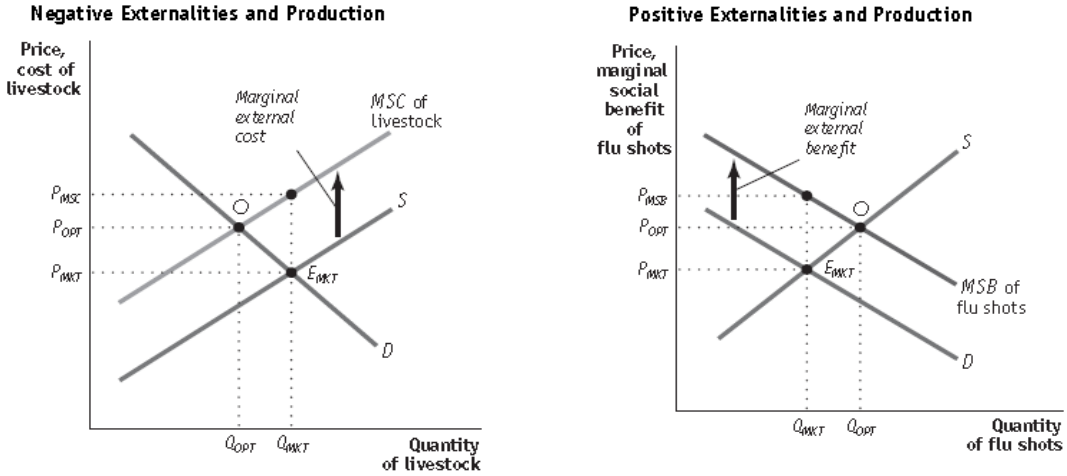
Map 2.3: Mean species abundance 1970 (MNP/OECD 2007)



Map 2.6: Mean species abundance 2050 (MNP/OECD 2007)

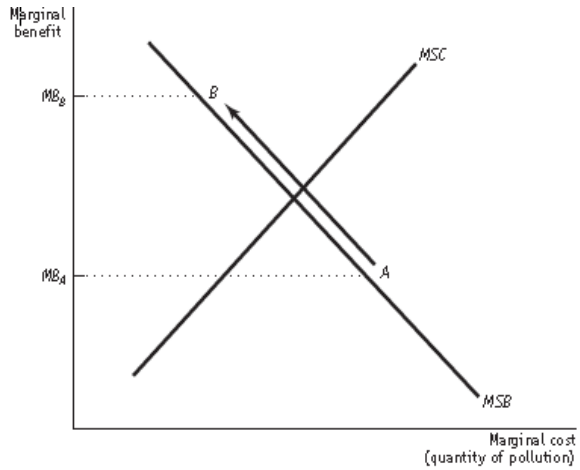


3. How Did Economists Blow according Krugman



The marginal social benefit of pollution represents the *willingness of polluters* to pay for the right to pollute; their willingness to pay is equal to the cost of reducing pollution by that quantity of emissions. In the graph below, as we move from point *A* to point *B,* it becomes progressively harder to achieve lower amounts of pollution and therefore more expensive to achieve these lower amounts of pollution. To produce less pollution, a polluter would have to spend a greater amount of money on pollution-reducing equipment or production methods; therefore, the marginal social benefit of producing that unit of pollution is high.

The socially optimal quantity of pollution is where marginal social cost and marginal social benefit are equal.



But.. "In economics, an externality or spillover of an economic transaction is an impact on a party that is not directly involved in the transaction. In such a case, prices do not reflect the full costs…of production…or a product or services…In a competitive market, the existence of externalities would cause either too much or too little of the good to be produced or consumed…If there exists external costs such as pollution, the good will be overproduced by a competitive market, as the producer does not take into account the external costs when producing the good…economics has shown that the existence of externalities result in outcomes that are not socially optimal."Economists almost always cite the same examples of negative externalities that cause over-production of a good or service. The examples that they look to are usually physical phenomena such as pollution, traffic, noise or crime. These are externalities that are easy to measure and easy to quantify. Everyone can understand that if a polluter doesn't have to pay for the cost of his pollution, production costs will be understated and since the producer isn't absorbing the full costs of production he will over-produce the item causing pollution above the socially optimal amount.

However, non-tangible externalities are tough to recognize, quantify and analyze. For economists to understand non-tangible externalities, they need to be psychologists, sociologists, lawyers and

behavioral experts. These are social science disciplines that economists are notoriously bad at mastering and often considered beneath their position in academia.

4. TOWARDS A VALUATION FRAMEWORK

The term market failure can cover anything from the lack of markets for public goods and services(called public goods failure, e.g. absence of "markets" for species conservation or for most of the regulating and supporting services of ecosystems) to imperfections in structure or process around markets which cause inefficiency and distortions (e.g. it can be argued that some price distortions in today's carbon markets are attributable to timid emissions caps). Furthermore, there is potential for market-based instruments to produce results that are socially unacceptable - carbon markets could be said to have helped legitimize global greenhouse gas emission levels (42 billion tonnes), that are perhaps five times the Earth's ability to absorb such gases (Stern 2006).

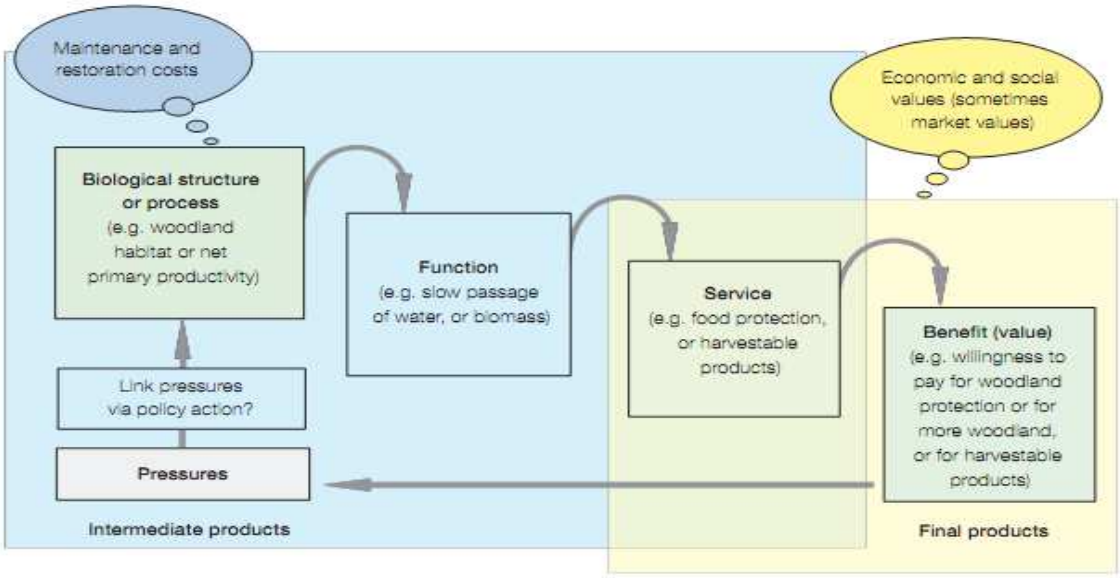
The size of the challenge of market failure should not be underestimated: for some services (e.g. scenic beauty hydrological functions and nutrient cycling) it is difficult .

"GDP of the poor"The full economic significance of biodiversity and ecosystems does not figure in GDP statistics, but indirectly its contribution to livelihood and well-being can be estimated and recognized. Conversely, the real costs of depletion or degradation of natural capital (water availability, water quality, forest biomass, soil fertility, topsoil, inclement micro- climates, etc.) are felt at the micro-level but are not recorded or brought to the attention of policy makers. If one husbandry and forestry sectors properly, the significant losses of natural capital observed have huge impacts on the productivity and risks in these sectors. Collectively, we call these sectors (i.e. agriculture, animal husbandry, informal forestry) the "GDP of the poor" because it is from these sectors that many of the developing world's poor draw their livelihood and employment. Furthermore,

we find that the impact of ecosystem degradation and biodiversity loss affects that proportion of GDP most which we term the “GDP of the poor”.

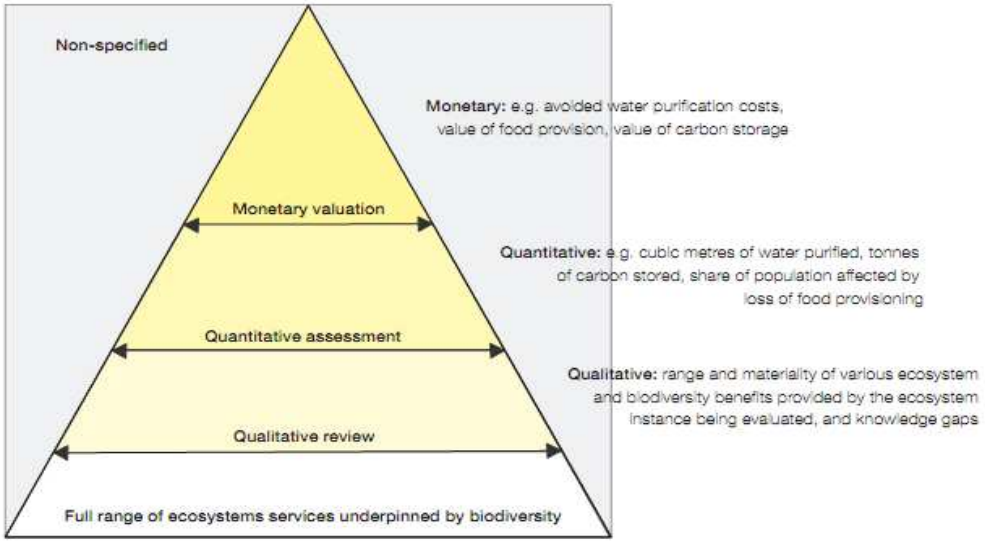
The end-use of ecosystem and biodiversity valuations in National Income Accounting, either through satellite accounts (physical and monetary) or in adjusted GDP accounts (“Green Accounts”) does not of itself ensure that policy makers read the right signals for significant policy trade-offs.

Figure 3.1: The link between biodiversity and the output of ecosystem services



Source: Roy Haines-Young, presented by J-L Weber, the Global Loss of Biological Diversity, 5-6 March 2008, Brussels

Figure 3.2: Valuing ecosystem services



5. Bolivia and food sovereignty

"The security and food sovereignty is not only the ability to produce enough food for domestic consumption, but also in knowing hands of those who are producing the same and what are some of the external and internal variables that influence prices. "

Based on the concept developed in the World Food Summit held in Rome in 1996, convened by FAO and that is still in force, clearly states that food security is the right of everyone to have access to safe and nutritious regardless of national origin thereof. This definition provides an opening of domestic markets in underdeveloped countries and a clear benefit to business and industries of developed countries.
This orientation of the economy expressed in agricultural production has been an unprecedented strengthening of the agribusiness sector worldwide, but with very serious consequences at the global social and environmental paradoxically has resulted in crises.

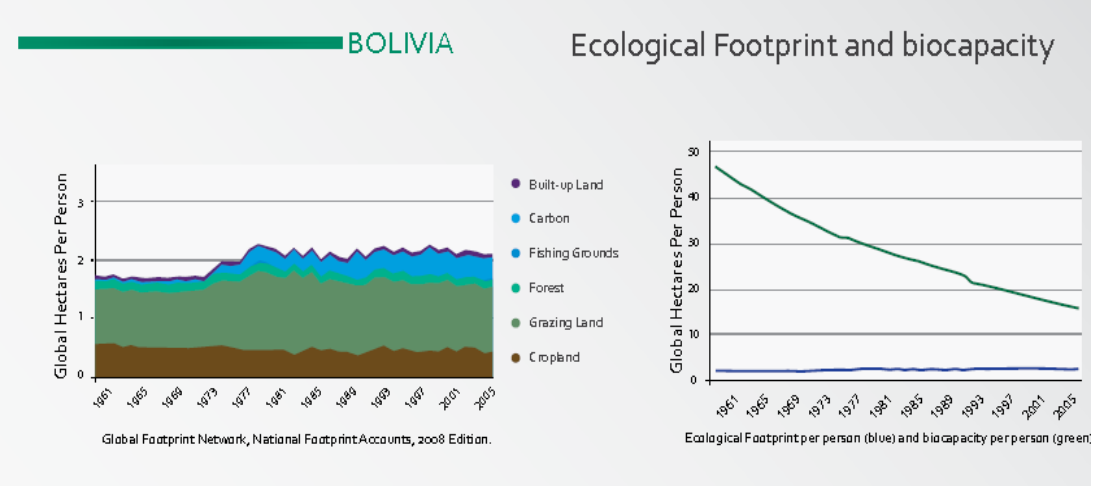
Thus, in the current world situation, and social and environmental impacts of products, a wide discussion, the result of global concern - with reference to the food crisis, energy crisis, economic crisis and environmental crisis. But it would be more sustainable alternative use of Biogas . Obviously all the crises mentioned are

interrelated. However, it should also clarify that the developed countries, suggest the solution to the crisis based on your interests.
That is, the food crisis will be based on the promotion of increased food production and for that transnational seed companies already have the solution: GM seeds which obviously does not pay unless they are accompanied by herbicides, insecticides, fungicides etc.. , Which are manufactured by the same seed companies and / or its partners. This will surely demand a greater use of energy and also it is the solution: Biofuels and biofuels, which pose a threat to biodiversity**.**

Bolivia has 650 species of fish, 200 species of amphibians, 270 reptile species, 1,400 bird species, 400 mammal species and 20,000 plant species. The biodiversity would be greater if the country had coastline in this area and if more is invested in research.

"We still think that mining, oil or some other areas are our only source of income. Costa Rica is home to nearly those resources in terms of ecotourism. Bolivia could generate development opportunities without affecting their territory "

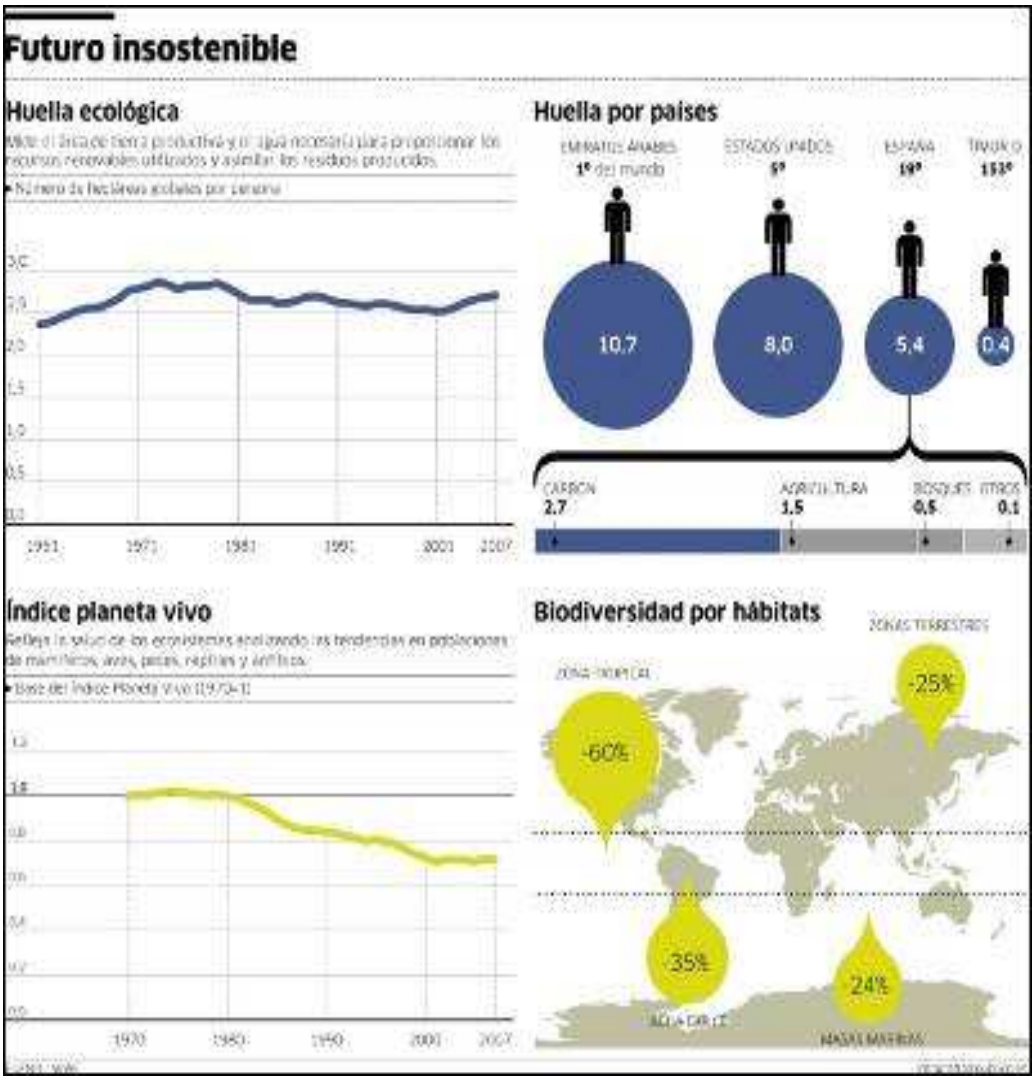
At this moment forward policies for sustainable management of biodiversity in order to support those people who are in areas where a great variety of flora and fauna to be the proper use of these ecosystems, all with the sole purpose of conserve, restore and protect biodiversity.

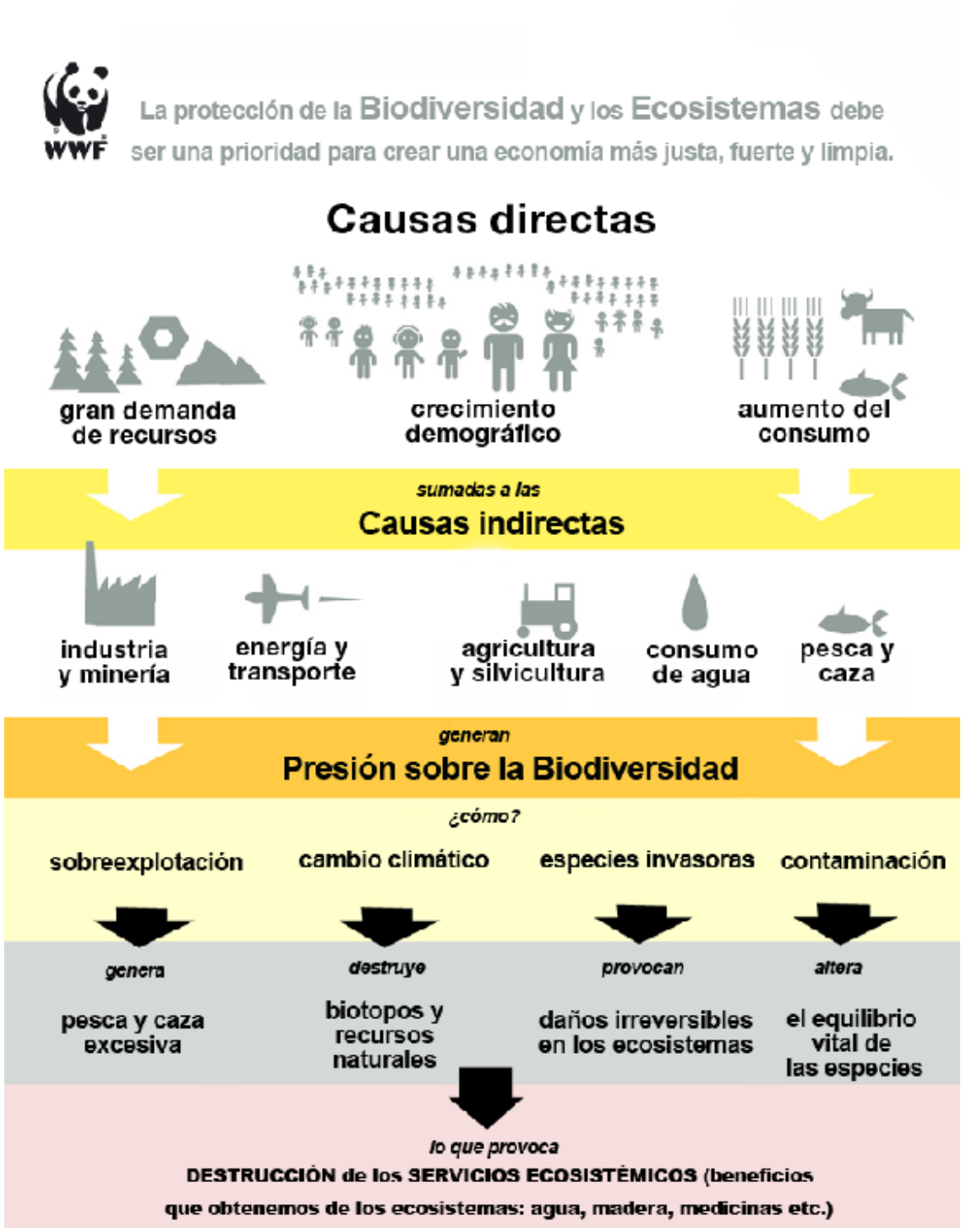


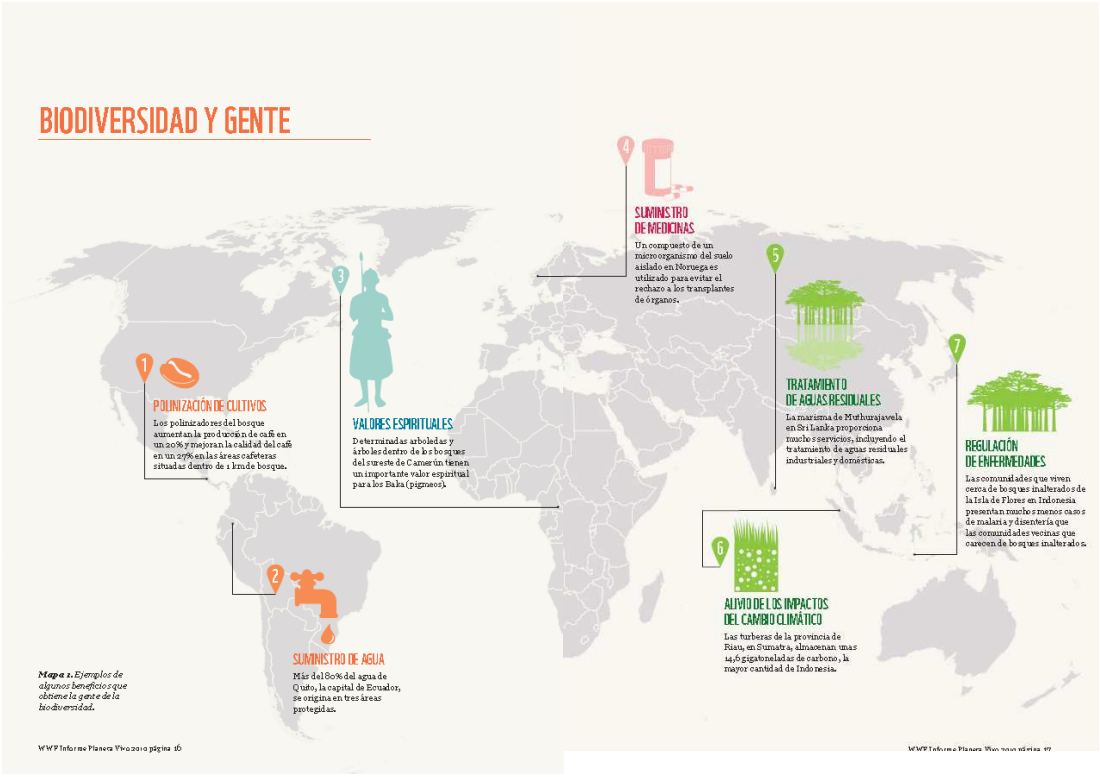
	Ecological Footprint	Biocapacity	Deficit/Remainder	
Global	17.5 billion gha	13.6 billion gha	3.9 billion gha	Footprint 30% larger than biocapacity
Global Per capita	2.7 gha	2.1 gha	0.6 gha	
Andean Community	174.0 millon gha	462.9 million gha	288.9 million gha	Biocapacity 165% larger than Footprint.
Andean Community Per capita	1.8 gha	4.8 gha	3.0 gha	

Andean Community: Bolivia, Colombia, Ecuador, Peru.

Annexes




La protección de la Biodiversidad y los Ecosistemas debe ser una prioridad para crear una economía más justa, fuerte y limpia.
Causas directas
gran demanda de recursos
crecimiento demográfico
aumento del consumo
sumadas a las
Causas indirectas
industria y minería
energía y transporte
agricultura y silvicultura
consumo de agua
pesca y caza
generan
Presión sobre la Biodiversidad
¿cómo?
sobreexplotación
cambio climático
especies invasoras
contaminación
genera
destruye
provocan
altera
pesca y caza excesiva
biotopos y recursos naturales
daños irreversibles en los ecosistemas
el equilibrio vital de las especies
lo que provoca
DESTRUCCIÓN de los SERVICIOS ECOSISTÉMICOS (beneficios que obtenemos de los ecosistemas: agua, madera, medicinas etc.)



***Mapa 1.** Ejemplos de algunos beneficios que obtiene la gente de la biodiversidad.*

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