

# Sustainable Alternatives for Poverty Reduction and Eco-Justice



Sustainable Alternatives for Poverty  
Reduction and Eco-Justice:  
Volume 1 2nd Edition

Edited by

Lucas Andrianos, Jan-Willem Sneep,  
Guillermo Kerber and Robin Attfield

**CAMBRIDGE**  
**SCHOLARS**  

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**P U B L I S H I N G**

Sustainable Alternatives for Poverty Reduction and Eco-Justice:  
Volume 1 2nd Edition,  
Edited by Lucas Andrianos, Jan-Willem Sneep, Guillermo Kerber and Robin Attfield

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# PATRIARCHAL GREETINGS

H.A.H. BARTHOLOMEW

BY THE GRACE OF GOD

ARCHBISHOP OF CONSTANTINOPLE,  
NEW ROME AND ECUMENICAL PATRIARCH  
SPIRITUAL MENTOR OF THE OAC<sup>1</sup>



Your Eminence Metropolitan of Kissamos and Selinon and Exarch of Western Crete, Our beloved brother and concelebrant in the Holy Spirit, Mgr Amphilochos, President of the Orthodox Academy of Crete, may the grace and peace of God be with your Eminence.

The Orthodox Church has always attributed the greatest importance to the purpose of the creation of humankind, which has been succinctly defined in the book of Genesis: “And the Lord God took the man whom he had formed, and placed him in the garden of Delight, to cultivate and keep it” (Gen. 2.15 Septuagint); the Church understood as paradise the whole creation made by God for the sake of humankind.

Unfortunately, the rupture in the relation between Man and God that occurred through the disobedience of Adam and Eve broke the relation of humankind and the natural environment, leading to irreparable distortions. This, because fallen man, by appropriating the creation, considered himself as its master, instead of steward who gained the right to enjoy the fruits and goods of nature by divine dispensation, and subjected the

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<sup>1</sup> Translated by Dr. Vasilios Meichanetsidis, scientific staff of the Orthodox Academy of Crete.

creation to the “vanity” of his greed and arrogance, as St. Paul accurately states (Rom 8:20). This illogical and selfish use of creation by a few not only damaged it, but deprived a great number of people of the necessary resources for their survival, and continues to do so.

The Mother Church of Constantinople, within the framework of her sacred mission, labours with all Her power for the awakening of the conscience of man, especially so of the leaders, and for the sensitization towards the pursuit of new solutions and ways, capable of stopping the painful consequences of the continuing and ever increasing human greed and the destruction of the natural environment resulting from this. For that reason and with great joy and satisfaction, We place under Our aegis the conference, entitled “Sustainable Alternatives for Poverty Reduction and Eco-Justice”, organized by the Institute of Theology and Ecology of the Orthodox Academy of Crete with the active participation of various Institutes and Associations, in order to exchange views and to undertake a series of actions, combining the protection of the environment with the just distribution of its goods to all people, and aiming at the resolving of phenomena of poverty and wretchedness. Being convinced that any solution to this most important issue, that is of the relation of humankind with the natural environment, cannot dissociate the scientific dimension from the ethical one, We are pleased and delighted about this common consultation between representatives of the Church and the scientific world under the auspices of our Holy Church and of the Orthodox Academy of Crete, looking forward with great interest to the results and conclusions of this international conference. Thus, We pray to our God and Creator of the whole universe for the success of the deliberations of this first international ecological and theological conference to be of benefit for humankind and for the protection of the natural environment.

May the grace of God and His infinite mercy be with you all.

24th of September, 2012

† Bartholomew of Constantinople, your beloved brother in Christ

## MESSAGE OF WELCOME

**JAN-WILLEM SNEEP,**  
CHAIRMAN OF THE PLANTA EUROPA FOUNDATION

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Distinguished guests, ladies and gentlemen, friends,

It is a great honour and pleasure for me to be here. I would like to thank the Orthodox Academy of Crete for organising this conference to share our experiences and knowledge on sustainable alternatives for poverty reduction and ecological justice.

With more than 7 billion people, we are living in a fascinating world with a very rich biodiversity, a world with millions of living organisms. This world provides the raw materials, goods and services we need to be able to live, work, produce and consume. To make the strengthening and sustainable use of biodiversity possible, changes are needed in current consumption and production patterns, the distribution of wealth, access to technology and the effectiveness of international institutions. This is not only an ecological task, but also a socio-economic one.

The concept of sustainability rests in fact on three pillars: ecological, economic and socio-cultural, which together must remain in balance at all times. There can be no sustainability if growth in one of the pillars proceeds at the expense of another pillar. Sustainable development also excludes passing on problems to other parts of the world, or to future generations. The three areas of transition necessary for sustainable development are: renewable energy, sustainable use of biodiversity and natural resources, and sustainable agriculture.

Poor populations are often dependent for their survival on the use of natural resources without the space and means necessary to achieve sustainable use. As a result of extreme income inequality and a skewed

balance of ownership of valuable natural resources, poor populations are forced into marginal areas. Not only do the poor benefit from biodiversity; biodiversity also benefits from poverty reduction measures. After all, the lack of basic security, ambiguous land rights, and restricted access to health care, credit and education lead to overpopulation, migration, and non-sustainable use of natural resources. Isolation of poor populations deepens their dependence on natural resources. The elimination of poverty and the strengthening and conservation of biodiversity therefore go hand-in-hand.

The downward spiral of degradation and impoverishment can be broken by stimulating participative management of natural resources which focuses on sustainability. Giving the population a voice should be coupled with a transfer of knowledge and skills. This gives the population a feeling of responsibility for resources management with a longer-term perspective. If the natural habitat remains ecologically intact and the local population can survive there, this will create the necessary conditions to discourage migration to the cities.

Development processes are often coupled with the non-sustainable use of natural resources which has a negative impact on natural forests, water reservoirs and wetlands. Unfortunately, many poverty reduction strategies devote little attention to sustainable development in relation to the environment and biodiversity.

Macro-economic processes and international trade relations, which may alleviate poverty in the short term, may be very negative for biodiversity in the long term. Examples include the trade in soybeans for animal feed in tropical forests and dry areas in Latin America and Asia, the investments in palm oil plantations in the tropical rain forests of Indonesia, and the exploitation of wood in central Africa and its effect on large mammal populations. Trade liberalisation can have positive impacts on poverty reduction and biodiversity provided these clearly take place in the context of sustainability.

The disproportionate claim made on biodiversity and natural resources in development countries by rich countries and the fact that biodiversity is not reflected in prices serve to promote inequalities. Sustainable trade relations and the integration of the environmental factor into prices, the abolition of unfair subsidies and the prevention of new trade barriers have

the potential to reduce poverty as well as to promote the conservation and sustainable use of biodiversity and natural resources.

The strengthening and sustainable use of biological diversity has to be seen as a general concern of humanity.

Due to the increasing use of social media we will be better informed on people who are living in other areas. Social disruptions like war, crime and corruption divert resources from the area of greatest human need, damage the capacity of societies to plan for the future, and generally threaten human well-being and the environment.

This reminds me of the first children's book of the United Nations: Pepito's speech at the United Nations. One evening at dinner Pepito made a decision. On the plate before him were Spanish rice, Danish rolls, Swiss cheese and salad with French dressing and Greek olives. The dessert would be American apple pie. He said: the United Nations should be like this dinner. All parts go well together. I am going to make a speech in the General Assembly Hall to help solve the problems of the world. With his parents he visited the United Nations. During the guided tour he felt asleep. In his dream he was guest speaker and poised to speak to all the nations. But he could not speak. Then he smiled and then (wonder of wonders), his big sunny smile was reflected on the faces of all delegates from all the countries of the world, and everyone smiled back at him. Pepito had not given the speech he had prepared, but his real speech was his smile, and it said more than any words of any language. It said to everyone who gave it: I am a friend and I offer you friendship. Everybody was telling him his smile was the best speech ever given. So, the little boy Pepito brings the world kindness, a single smile and a dream of peace understood by all the people of the world.

The Earth is our home and all Earth's species, including *Homo sapiens erectus*, are our family, our sisters and brothers. It is our duty to take care of all habitats and their living inhabitants, as we also take care on our own children. To take actions together now for life on Earth we must learn to live together.

I hope this conference will show us a multitude of sustainable alternatives for poverty reduction and ecological justice, allowing us to continue to believe in a wonderful world for all people in future, And I invite you all to give your smile, just as Pepito did, to the world, so that everyone in it

may work together on poverty reduction and ecological justice for the world as a whole.

I wish you a very pleasant and fruitful conference.

Thank you for your attention.

Dr Jan-Willem Sneep,  
Chairman,  
PlantaEuropa Network

# FOREWORD

**GUILLERMO KERBER**

PROGRAMME EXECUTIVE ON CARE FOR CREATION  
AND CLIMATE JUSTICE WCC

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## **Climate, sustainability and ecological justice**

As part of the long lasting collaboration between the World Conference of Churches and the Orthodox Academy of Crete, in 2012 the International Conference on Sustainable Alternatives for Poverty Reduction and Eco-Justice was organized. On this occasion about twenty members of the WCC Working Group on Climate Change participated in the Conference, bringing their various experiences and contributing to the objective of the conference of engaging multidisciplinary and ecumenical dialogues on key social, economic and ecological concerns.

When we look at sustainability and ecological justice, two of the core concepts of the conference, one of the most challenging threats of the world today is climate change. The scientific consensus on the topic shows that global warming is impacting various regions of the world and if a cut on CO<sub>2</sub> emissions doesn't take place immediately, this will have dramatic consequences for the whole world and future generations. And those who are especially affected are the vulnerable and poor communities in various regions of the world.

In the last thirty years climate change has changed from being a matter for a few specialists to become a matter of discussion in various public spheres. At the international arena, for instance, the adoption of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 during the UN Conference on Environment and Development in Rio de

Janeiro, Brazil, was a benchmark in a process which had started twenty years before with the UN Conference on the Human Environment, which took place in Stockholm in 1972. The UNFCCC aims at "stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (Article 2). In 1995, the UNFCCC opened its Conference of Parties (COPs) in Berlin, and in 1997 the COP adopted the Kyoto Protocol, the binding instrument of the Convention, which sets binding obligations on industrialised countries to reduce emissions of greenhouse gases.

The World Council of Churches (WCC) has a long history dealing with climate issues. It began referring to climate change (then called "global warming")<sup>1</sup> as early as 1988 in the Justice, Peace and Integrity of Creation (JPIC) conciliar process which led to the JPIC Convocation in Seoul in 1990. It is at this time that the Working Group was created. The group helped to analyse the scientific data, deepen the ethical and theological reflection and advocate at the UN, having participated at all UNFCCC annual conferences (called COPs – Conference of Parties). The COPs have had in recent years an extraordinary development. From a few hundred participating at the first COPs, tens of thousands participated in the COPs in Copenhagen in 2009, Cancun in 2010 and Durban in 2011.

In parallel to international negotiations, the mobilization of civil society in recent years has been impressive all over the world with for instance the 350 campaigns or the Global Call for Climate Action, best known as "tcktcktk"<sup>2</sup>. Churches and the ecumenical movement at large have been involved in this process, with their own contribution, the Time for Climate Justice campaign<sup>3</sup>.

One of the key components of the ecumenical advocacy work has been to link climate change with justice. An example of the rationale for this linkage is expressed in the joint declaration from the Lutheran World Federation and WCC delegates to a UN Climate Conference in Cancún, México in 2010 (COP 16)<sup>4</sup>: "In the churches' perspective, justice must be

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<sup>1</sup> See e.g. WCC, "An evaluation of the UNCED Conventions" in *Searching for the new heavens and the new earth: An Ecumenical response to UNCED*, where under the section titled Climate Change, the term global warming is frequently used as a synonym of climate change (1992: 13 -14).

<sup>2</sup> Cf. [www.350.org](http://www.350.org) and [tcktcktk.org](http://tcktcktk.org).

<sup>3</sup> Cf. [www.climatejusticeonline.org](http://www.climatejusticeonline.org)

<sup>4</sup> See the Declaration "Why are the churches at the UN Conference on Climate

the basic criterion of applied ethics in all decisions concerning the measures to cope with climate change. Although climate change is a global issue affecting all peoples and nations, those who are and will increasingly be affected by negative climate change consequences are the vulnerable communities who have contributed the least to global emissions. These include women and children, indigenous peoples, poorest communities, people with disabilities and inhabitants of coastal low lying areas. Vulnerable communities and states are also much more dependent on natural resources for their subsistence and do not have the means to mitigate emissions and to adapt to climate change. Their survival is at risk, and justice requires that the nations most responsible historically for the adverse ecological conditions should take the greatest responsibility towards the adaptation of these vulnerable communities and nations.”

Advocacy for climate justice is rooted in the churches’ affirmation that climate change has to be addressed holistically. This has meant recognizing the interconnectedness of the various dimensions of the climate crisis—including environmental, economic, social, and cultural. Furthermore, churches have been stressing that the climate change crisis, as part of the ecological crisis, is also an ethical and spiritual crisis. We are quite aware of the environmental, political, economic, social and cultural aspects of the crisis. But sometimes, the spiritual dimension is overlooked. When we look at sustainability and ecological justice, we need to bring in the spiritual dimension as well.

This has been one of the achievements of the Orthodox Academy of Crete when organizing various conferences: bridging the gaps between the sciences, ethics, theology and spirituality. The various contributions to the conference, collected in this book, show the interlinks between these different aspects and deepen reflection on various topics.

Participating at SAPREJ 2012 was, for the WCC Working Group on Climate Change and for me personally, a profound experience which allowed us to discuss matters of concern with experts from all over the world and to build a community that lasts beyond the period of the conference. For this we are thankful to the authorities of the OAC and

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Change in Cancun” at: <http://www.oikoumene.org/en/resources/documents/wcc-programmes/justice-diakonia-and-responsibility-for-creation/climate-change-water/why-are-the-churches-at-the-un-conference-on-climate-change-in-cancun> (accessed 12 August 2013)

especially to Dr Lucas Andrianos, who, putting together all the building blocks, guaranteed the meaningful flow of the conference.

Dr. Guillermo Kerber  
Programme Executive  
World Council of Churches

## EDITORIAL

LUCAS ANDRIANOS

HEAD OF THE INSTITUTE OF THEOLOGY AND ECOLOGY,  
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### **“A common search for solutions to global crisis and injustice”**

The first international conference on Sustainable Alternatives for Poverty Reduction and Eco-Justice (SAPREJ-12) took place in Kolympari, Chania, Crete, at the Orthodox Academy of Crete (OAC) in September 27<sup>th</sup> – 30<sup>th</sup>, 2012. This first conference was organized by the Institute of Theology and Ecology - OAC and as an outcome of this initiative, the current book ‘Sustainable Alternatives for Poverty Reduction and Eco-Justice-12, Vol.1’ is published and distributed worldwide.

The editorial of this SAPREJ-12 book began in the same way as the previous book series of the Orthodox academy publications. The reason is simple and self-explanatory, as SAPREJ-12 is the natural continuation of the efforts of the Institute of Theology and Ecology OAC in publishing ecological texts related to ecological concerns and the search for common sustainable strategies to the preservation of the Divine Creation.

Consequently, the content of this book addresses, once more, the need for human response to the ecological crisis and human sufferings – poverty – from socio-economic problems. It affirms human responsibility for the well-being of the Earth and the vast diversity of Life. More than forty five (45) abstracts were submitted from about twenty four countries worldwide: *Algeria, Australia, Austria, Belgium, Bangladesh, Canada, Czech Republic, Germany, Ghana, Greece, India, Kenya, Korea, Madagascar, Romania, South Africa, Sweden, Switzerland, Tanzania, Thailand, The Netherlands, Turkey, United Kingdom and the United*

*States of America*. From these papers, about thirty (30) were selected for presentation and publication in this book.

The aim of the SAPREJ-12 conference is to engage multidisciplinary and ecumenical dialogues on key social, economic and ecological concerns from a variety of perspectives. Among others, the goal of the conference is to build a permanent partnership and long life learning process to promote social and ecological justice.

Participants were interested in multi-disciplinary exchanges and insights, with a focus on religious-based and scientific approaches to sustainability problems and injustice. The conference was a blend of learning and discussion, while attending to the magnificent Earth and cultural context of this region of Crete.

The selected papers are classified in six thematic sections: (1) Biodiversity, sustainable policy, religion and ethics; (2) Financial crisis, the global market and poverty; (3) Ecological crisis, climate change and eco-justice; (4) Economical ethics and ecological economics; (5) Production, distribution and consumption patterns; (6) Permaculture and case studies.

The expected perspective for the publication of this book is to promote collaboration between theology and applied science in order to find solutions to poverty and environmental problems. This step was initiated since the foundation of the Institute of Theology and Ecology at the OAC and it is reinforced by the recent publication of the ECOTHEE books. Now we expect more in-depth progress so it is essential that we develop the SAPREJ book series so that our skills to combine science and religion achieve a better management of our planet.

I would like to thank all our sponsors and supporting institutions for the SAPREJ-12 conference. Special thanks are due to the World Council of Churches – Care for Creation on Climate Justice, the Holy Convent of Chrysopigi and to all SAPREJ-12 participants for their valuable contributions and unforgettable fellowship.

Last but not least, we would like to thank the “PlantaEuropa” Foundation, the local Television Channel “NEA TV”, all the primary and secondary “schools” from Chania and “Flowers of Crete” for their support in organizing the environmental exhibition and aspects that made the

SAPREJ-12 a successful event, promoting ecological awareness and awareness of the need to protect the earth and all Creation.

Blessings and Peace to All in Christ,

Dr. Lucas Andrianos  
Head of Institute and SAPREJ founder  
Institute of Theology and Ecology  
Orthodox Academy of Crete



# **BIODIVERSITY AND ECOLOGICAL CRISIS**

# NATURE CONSERVATION AND ECOLOGICAL ETHICS

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## Abstract

*Our planet has a very rich biodiversity. The number of species of plants, animals and micro organisms, the enormous diversity of genes in these species, the different ecosystems on the planet, such as deserts, rainforests and coral reefs are all part of a biologically diverse Earth. The biodiversity we see today is the fruit of billions of years of evolution, shaped by natural processes and, increasingly, by the influence of humans. It forms the web of life of which we are an integral part and upon which we so fully depend. Healthy ecosystems provide vital goods and services to human and other organisms. The ongoing growth of human populations has an enormous impact on the use of land and the increasing use of our natural resources. Our soils, freshwater, oceans, forests and biodiversity are being rapidly degraded. Reducing negative human impact and enhancing ecosystem services needs good management of oceans, freshwater systems, land and atmosphere. The human impact is called the Ecological Footprint, which is defined as the area of productive land and water ecosystems required to produce the resources that the population consumes and assimilate the wastes that the population produces, wherever on Earth the land or water is located.*

*Biodiversity and development are closely linked. Biodiversity sustains development and development has an impact on biodiversity, either positive or negative. Some key development sectors and related activities depend directly on biodiversity, and contribute to poverty alleviation. These sectors include agriculture and livestock, forestry, fishing, tourism and, in many areas of the world, housing construction.*

*Sustainability is the route towards economic and social development. The Convention on Biological Diversity (CBD) invites the Parties to*

*integrate the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies. The underlying driver of direct human impact on the environment is human consumption. This impact is reduced by not only diminished consumption but by also making the full cycle of production, use and disposal more sustainable. It is time to rethink how we grow, share and consume our food. The “reduce, reuse and recycle” shoppers are using their purchasing power for ethical consumerism.*

## **1. Introduction**

Today we are living with 7 billion people on this planet. There are 21 cities with more than 10 million citizens (in 1975 there were only 3 such cities). In 2050 more than 9 billion people will be expected. Most of the increase will be in developing countries whose population is projected to rise from 5.6 billion in 2009 to 7.9 billion in 2050. Europe has become highly urbanised in recent decades. Two out of three of the more than 800 million Europeans live in cities now, which accounts for 1% of the continent's surface area.

Our planet has a very rich biodiversity. (*See YouTube 'Earth': this you need to see.*). This means: the variety of all animals and plant species on our planet, together with all the places where these species are found (the ecosystems).

The number of species of plants, animals and micro-organisms, the enormous diversity of genes in these species, the different ecosystems on the planet, such as deserts, rainforests and coral reefs are all part of a biologically diverse Earth.

Most nature conservation organisations are only focussed on the conservation of priority animals. The focus of WWF is on very attractive, good looking species such as Polar Bear, Panda, Elephants, Tigers, Rhinoceros, Sea Turtles and Whales. These species are more attractive than (for example) threatened snakes and spiders. They call up positive emotions.

Scientists estimate there are between 5 and 15 million species of plants, animals and micro-organisms existing on Earth. We know there must be at least 12 million living species. Tropical forests represent some 5 percent of

the earth's surface but harbour 50 percent of all living species. There are 29,375 plant species in Indonesia, compared to 3,270 in Canada. At some places in the upper Amazon basin you can find 1,200 kinds of butterflies, or about 7 percent of the world's species. There are over 50,000 tree species in tropical areas but only around 2,000 in temperate regions. (700 species of tree are found in all of Canada and the United States.)

The total number of species is unknown. Only about 1.8 million species of plants, animals and micro-organisms have been identified (with numbers which are only a soft guide (2010).

The biodiversity we see today is the fruit of billions of years of evolution, shaped by natural processes and, increasingly, by the influence of humans. It forms the web of life of which we are an integral part and upon which we so fully depend.

## **2. Why Is Biodiversity Important?**

Biodiversity fosters ecosystem productivity, where each species, no matter how small, has an important role to play. Examples:

- A larger number of plant species means a greater variety of crops.
- Greater species diversity ensures natural sustainability for all life forms.
- Healthy ecosystems can better withstand and recover from a variety of disasters.

And so, while we dominate this planet, we still need to preserve the diversity in wildlife. The tremendous growth in human population is the root of biodiversity crises.

A healthy biodiversity provides a number of natural services for everyone: Ecosystem services, such as

- Protection of water resources
- Soils formation and protection
- Nutrient storage and recycling
- Pollution breakdown and absorption
- Contribution to climate stability
- Maintenance of ecosystems
- Recovery from unpredictable events

Biological services, such as:

- Food
- Medicinal resources and pharmaceutical drugs
- Wood products
- Ornamental plants
- Breeding stocks, population reservoirs
- Future resources
- Diversity in genes, species and ecosystems

Social benefits, such as:

- Research, education and monitoring
- Recreation and tourism
- Cultural values (aesthetic, spiritual)

That is quite a lot of services we get for free. But at the same time we fully depend on the biodiversity on our planet. We simply cannot live without it.

Also each species depends on the services provided by other species to ensure survival. It is a type of cooperation based on mutual survival and is often what a “balanced ecosystem” refers to. One third of all our food – fruit and vegetables – would not exist without pollinators visiting flowers. But honeybees, the primary species that fertilizes food-producing plants, have suffered dramatic declines in recent years, mostly from afflictions introduced by humans. Bees are vital to biodiversity.

*(See YouTube ‘Biodiversity starts with a B’.)*

### **3. Impact on Biodiversity**

Healthy ecosystems provide vital goods and services to human and other organisms. Through the provision of biological resources and ecosystem services, biodiversity is an essential component of human development. The ongoing growth of human populations has an enormous impact on the use of land and the increasing use of our natural resources. Our soils, freshwater, oceans, forests and biodiversity are being rapidly degraded. Climate change is putting even more pressure on the resources we depend on.

Today’s biodiversity crisis is being caused by ourselves. Reducing negative human impact and enhancing ecosystem services need good management of oceans, freshwater systems, land and atmosphere.

Loss of biodiversity stems largely from the habitat loss and fragmentation produced by the human appropriation of land for development (urbanisation and mobility), forestry and agriculture as natural capital is progressively converted to man-made capital. Ten thousand years ago humans began to cultivate crops, drastically changing the human ecological niche. People around the world utilize over 40.000 species every day. All the crops that we cultivate (corn, wheat, potatoes, tomatos, apples, oranges and so on) are domesticated from wild species. Species diversity is also important to agriculture: approximately 7000 plant species are cultivated worldwide. Genetic diversity allows adaptation to climate change, pests and diseases and is therefore important to global food security.

We are destroying thousands of acres of forest a year, not only in the tropics, but everywhere. Over 1.6 billion people rely on forests and non-timber forest products for their livelihoods. Communities around the world depend on forests for goods such as food, medicines, firewood and building materials. Forests also maintain important ecosystem services including carbon sequestration, erosion control, watershed protection and nutrient cycling, and provide habitat for approximately 80% of the remaining terrestrial biodiversity.

The majority of biofuels (sourced from plants and extracted by a variety of methods), including bio-ethanol, bio-diesel and celluloid ethanol, require an increasing amount of land for biofuel crop production.

Food is essential to life. Feeding more than 7 billion human bodies takes a heavy toll on the Earth's resources. This begins with the appropriation of about 38% of the Earth's land surface and about 20% of its net primary productivity. Added to this are the resource-hungry activities of industrial agribusiness – everything from the crop need for irrigation water, synthetic fertilizers and pesticides to the resource costs of food packaging, transport (now a major part of global trade) and retail.

A profound change of the global food and agriculture system is needed if we are to nourish today's 925 million hungry people and the additional 2 billion people expected by 2050. The food and agriculture sector offers key solutions for development, and is central for hunger and poverty eradication.

The world's oceans – their temperature, chemistry, currents and life – drive global systems that make the Earth habitable for humankind. Our rainwater, drinking water, weather, climate, coastlines, much of our food, and even the oxygen in the air we breathe, are all ultimately provided and regulated by the sea. Careful management of this essential global resource is a key feature of a sustainable future. We are overharvesting the world's oceans. Many people depend on marine and coastal biodiversity for their livelihoods, including many people in the developing countries for whom fishing is a main subsistence and commercial activity. 25% of the marine species are found in coral reefs, which provide livelihoods for over 100 million people.

Water covers 71% of the Earth's surface. Of this is 97.5% is the salty water of the oceans and only 2.5% freshwater, most of which is locked up in the Antarctic ice sheet. The remaining freshwater is found in glaciers, lakes, rivers, wetlands, the soil, aquifers and the atmosphere. Due to the water cycle, fresh water supply is continually replenished by precipitation; however there is still a limited amount, necessitating management of this resource. During the 20th century, more than half the world's wetlands have been lost along with their valuable environmental services. Increasing urbanisation pollutes clean water supplies and much of the world still does not have access to clean, safe water.

Currently towards 35% of human water use is unsustainable. From 1961 to 2001 water demand doubled – agriculture use increased by 75%, industrial use by more than 200% and domestic use by more than 400%. In the 1990s it was estimated that humans were using 40-50% of the globally available freshwater in the approximate proportion of 70% for agriculture, 22% for industry, and 8% for domestic purposes, with total use progressively increasing.

Clean, accessible water for all is an essential part of the world we want to live in. There is sufficient fresh water on the planet to achieve this dream. But due to bad economics or poor infrastructure, every year millions of people, most of them children, die from diseases associated with inadequate water supply, sanitation and hygiene. Water scarcity, poor water quality and inadequate sanitation negatively impact food security, livelihood choices and educational opportunities for poor families across the world. Drought afflicts some of the world's poorest countries, worsening hunger and malnutrition.

We depend on the living world for the oxygen that we breathe. Green plants produce oxygen through photosynthesis (sun energy). Since the industrial revolution the concentrated energy of the Sun stored in fossilized plants as fossil fuels has been a major driver of technology which, in turn, has been the source of both economic and political power. Fossil fuel (oil, coal, natural gases) is used for energy. The atmospheric increase in CO<sub>2</sub> was human-induced, mostly as a result of fossil fuel emissions.

Human impacts on the atmosphere also include the air pollution in cities, the pollutants including toxic chemicals like nitrogen oxides, sulphur oxides, volatile organic compounds and particulate matter that produce photochemical smog and acid rain, and the chlorofluorocarbons that degrade the ozone layer. Stabilizing the world's climate will require high-income countries to reduce their emissions by 60-90% (Kyoto protocol).

#### **4. Ecological Footprint**

Biodiversity and development are closely linked. Biodiversity sustains development and development has an impact on biodiversity, either positive or negative. Some key development sectors and related activities depend directly on biodiversity, and contribute to poverty alleviation. These sectors include agriculture and livestock, forestry, fishing, tourism and, in many areas of the world, housing construction..

In this way we claim a great deal of the natural resources and biodiversity of other countries. This impact is called the Ecological Footprint. An ecological footprint is a measurement of human impact on the environment. It calculates the amount of land and water required to maintain a particular population.

The import of animal feed, wood, meat and other (often agricultural) products from all over the world makes up an ecological footprint. Wherever these imports are based on non-sustainable production, nature is impacted and we see a loss of biodiversity.

Mass tourism, the largest economic sector in the world, has a major impact on the use of space, the use of water and energy and other natural resources, and on biodiversity. There is also a lost of biodiversity whenever financial institutions invest on a large scale in non-sustainable production processes of foreign governments and enterprises. Some palm-oil plantations in Africa and Asia are conspicuous examples of this.