



CSOs and Ecological Economics: Mapping and Assessing CSO Engagement with the Field

(Deliverable 4 Report)



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- [Centre pour l'Environnement et le Développement, Cameroon](#)
- [Acción Ecológica, Ecuador](#)
- [Ecological Society Endemit, Serbia](#)
- [A Sud - Ecologia e Cooperazione, Italy](#)
- [Vlaams Overleg Duurzame Ontwikkeling, Belgium \(Flanders\)](#)
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Executive Summary

This report is part of the European Commission funded FP7 SiS project [CEECEC – Civil Society Engagement with Ecological Economics](#) – designed to enable Civil Society Organizations (CSOs) to engage in and lead collaborative research with ecological economists.

The survey presented here corresponds to deliverable 4 of CEECEC, produced in the scope of Work Package 5. The objective of this WP was to conduct a mapping and assessment of previous ecological economics research used by CSOs. The online [Handbook](#), including the CEECEC case studies and a glossary of ecological economics concepts served as the starting point of this survey, which was complemented with examples of the use of ecological economics concepts by CSOs taken from various other sources.

A categorization of ecological economics concepts, approaches and tools was adopted for the mapping exercise based on the following categories:

- resource accounting tools
- national well-being accounts
- cost benefit analysis and economic valuation
- multiple languages of valuation and post-normal science
- ecological distribution conflicts, environmental liability, ecological debt
- economic instruments for environmental policy
- resilience and co-management of natural resources.

The report presents examples of the use of the concepts included in each category in CSOs actions. The case studies developed in the scope of the CEECEC project have touched upon all the different categories of concepts, although with different emphasis and depth. The cases collected from other sources illustrate the use of the different concepts and tools in local, “on the ground” campaigns and activist action worldwide.

CSO members that participated in the CEECEC online course stated their expectations regarding the use of concepts and tools in their course evaluation forms. Concepts such as incommensurability of values, languages of valuation, economic valuation, ecological debt, social metabolism and weak and strong sustainability were deemed as very interesting/useful for framing debates and activist action. The tools/instruments that were considered to be more useful in the future those related to cost benefit analysis, multi-criteria evaluation, payments for ecosystem services, material flow analysis, ecological footprint, HANPP and participative decision making.

The underlying assumption of CEECEC is that CSOs have accumulated large stocks of ‘activist knowledge’, which sometimes becomes available to academics, and vice-versa, some concepts and methodologies developed within the science of ecological economics are useful in practice to environmental NGOs (Martinez-Alier et al., 2010). The examples collected here are illustrative of this idea of two-way interaction between science and activist knowledge in sustainability issues.

1. Introduction

This report is part of the European Commission funded FP7 SiS project *CEECEC – Civil Society Engagement with Ecological Economics* (www.ceecec.net) that aimed at enabling Civil Society Organizations (CSOs) to take part in and lead collaborative research with ecological economists. The overall focus is not on theory but on case study learning, whereby CSOs and academics identified and explored key issues for research on environmental and sustainability matters based on civil society needs and interests. The survey presented herein corresponds to Work Package 5 of CEECEC that aimed at mapping and assessing the use of ecological economics concepts and tools by CSOs. The starting point for this work was the case studies and glossary terms developed for the CEECEC [Handbook](#) of ecological economics, with other material drawn from a variety of other sources contributed from project partners and other desk-based research. This report will probably become part of the Introduction to the printed and e-book “Ecological Economics from the Ground Up” that Earthscan (London) is committed to publishing at the end of 2011, based on a revised version of the CEECEC Handbook.

The following section presents the categorization of ecological economics concepts, approaches and tools that was adopted for the mapping exercise, while section 3 presents examples of CSO use of the concepts included in each category. Finally section 4 presents an assessment of the use of ecological economics methods and tools by CSOs and identifies some key insights both for researchers and activists considering collaborative research on environmental issues.

2. A categorization of ecological economics concepts and approaches used by CSOs

In order to organize the information regarding the application of ecological economics in CSO work, a categorization of ecological economics concepts and tools was developed. For this purpose, clusters were organized considering research objectives and approach, theoretical underpinnings and the issues at stake. The following categories were defined:

- **resource accounting tools** including biophysical indicators and other resource accounting tools such as ecological footprint, Human Appropriation of Net Primary Production (HANPP), Energy Return On energy Investment (EROI), material flow analysis, resource efficiency and virtual water;
- **national well-being accounts** including efforts to measure well-being and progress towards sustainable development, be it by adopting economic approaches, subjective measures of well-being or the use of composite indexes;
- **cost benefit analysis and economic valuation** such as the application of economic valuation and cost-benefit analysis tools and approaches

based on the valuation of ecosystem services approaches; using for instance contingent valuation and the travel cost method.

- **multiple languages of valuation and post-normal science**, including CSO use of approaches whereby multiple languages of valuation are expressed and taken into account in policy processes. This covers the application of tools like multi-criteria analysis, scenarios and visioning and community participation exercises, as well as references to the adoption of the post-normal science paradigm;
- **ecological distribution conflicts**, where cases of CSO action dealing with the application of concepts such as corporate accountability, environmental liabilities, ecological debt, unequal ecological exchange and climate justice are included;
- **economic instruments for environmental policy** featuring CSO initiatives to apply environmental policy instruments like carbon trade, payments for ecosystem services, environmental taxes and certification schemes;
- **resilience and co-management** of natural resources, including CSO work on initiatives linked with community based management and joint forest management.

3. CSO use of concepts and tools – examples from CEECEC and from the literature

3.1 Resource accounting tools

Ecological footprint (Wakernagel and Rees, 1996) is perhaps the most widely disseminated and applied ecological accounting tool. This biophysical sustainability indicator, initially developed in academia (University of British Columbia) has been taken up by civil society organizations everywhere around the world. The Global Footprint Network (<http://www.footprintnetwork.org>) gathers organizations around the globe that are actively involved in research and application of the ecological footprint concept. The current listing of members of this network¹ includes 16 academic institutions, 16 consultancies, 6 corporations, 8 governmental organizations and 37 CSOs. This can be a proxy indicator of the relevance of the ecological footprint concept for these different groups of interested organizations. WWF (<http://wwf.panda.org>) has been using the ecological footprint concept in conjunction with the living planet index (a measure of the health of the world's biodiversity) very successfully to show the linkages between global demand for resources and biodiversity loss. This is the main focus of the Living Planet Report, published every 2 years by WWF.

The concept of water footprint (Hoekstra and Chapagain, 2007) that translates the application of the ecological footprint rationale to water use accounting, and that of virtual water (Allan, 1998) have also been increasingly used by civil society organizations. Similar to the ecological footprint network, the water footprint network (<http://www.waterfootprint.org/>) has a growing number of CSO

¹ As of September 2010

partners that apply this concept to their work and awareness raising campaigns. For example, Friends of the Earth Australia uses water intensity and virtual water to inform consumers of the water requirements implied in their food purchasing options. Virtual water has been widely disseminated, including via an iPhone application that displays information to users regarding how much water everyday consumed food and beverages really demand.

The application of water accounting tools is illustrated in the case of local governance in Hiware Bazar, Maharashtra, described by the Centre for Science and Environment, from India in the CEECEC Handbook (Singh, 2010a). This case deals with successful water harvesting and new institutions for water use, highlighting the village system of water budgeting and auditing. This example shows some of the limitations of the use of the concept of virtual water, namely the lack of acknowledgement of geographical and temporal differences in water availability.

Resource use and material flow accounting have also been used by CSOs worldwide to draw governmental and social attention to the un-sustainability of current patterns of resource use. For example, Friends of the Earth (FoE) Europe has collaborated with SERI (Sustainable Development Research Institute, a think tank from Vienna and CEECEC partner) to call on the European Union to measure its global resource use, in order to assess its dependency on resources and to create policies that will make it more resource efficient. They propose that 4 indicators should be used for this purpose (Friends of the Earth, 2010):

- land: the total area used in hectares
- materials: the total tonnage used, divided into biological and mineral materials
- water : water footprint, measured in litres
- climate: carbon footprint, including the carbon emissions associated with imported products.

FoE and SERI argue that these indicators already exist in the research literature and are all quite transparent, measuring clear physical quantities. The Spring Alliance manifesto, supported by the European Trade Union Confederation and a large number of environment, development and social non-governmental organisations, is also calling for Europe to measure its overall resource use.

Via Campesina is an international movement of peasants, small- and medium-sized producers, landless, rural women, indigenous people, rural youth and agricultural workers. It has 148 members from 69 countries from Asia, Africa, Europe, and the Americas. Via Campesina has used the EROI – Energy Return On (energy) Investment concept (Hall, et al, 1981; Cleveland et al., 1984) to call attention to the growing consumption of energy by modern agricultural and food systems and to contest the agro-fuels paradigm. This has led Via Campesina to proclaim that modern industrial agriculture is no longer a producer of energy but a consumer of energy, and that traditional peasant agriculture “cools down the Earth” (Martinez-Alier, 2011).

Conflicts related to the HANPP (Human Appropriation of Net Primary Production) in the Tana Delta in Kenya, have been analyzed by ICTA-UAB in collaboration with Nature Kenya and the East African Wildlife Society, in response to threats to biodiversity and pastoral livelihoods in the Delta (Temper,

2009). This case examines the historical background of development projects in the delta and how ecological economics indicators such as virtual water, HANPP and EROI can be used to argue for environmental and social sustainability in the delta in line with existing livelihoods there.

3.2 National well being accounts

The debate on the use of GDP as a measure of a nation's well-being has been a central concern in ecological economics literature. Alternative approaches to the development of synthetic indexes of sustainable well-being, that trace back to the 1970s (e.g. in the work of Roefie Hueting, Herman Daly, etc), can be classified into three groups (Commission on the Measurement of Economic Performance and Social Progress, undated): (1) attempts to develop 'corrected' GDP accounts, such as the ISEW (Index of Sustainable Economic Welfare) or the GPI (Genuine Progress Indicator); (2) construction of composite indexes that combine elementary sub-indexes in a more or less arbitrary fashion, such as the HDI (Human Development Index) and (3) measurement of social progress through the development of subjective measures of wellbeing. CSO action has incorporated the use of all 3 types of indicators.

Friends of the Earth (FoE) has used the Index of Sustainable Economic Welfare – ISEW (Daly and Cobb, 1989) to raise awareness for the need to consider alternative means for evaluating the success of the UK economy. They have developed a webpage where users learn the main issues regarding the ISEW, have access to data regarding a set of countries and the opportunity to create their own ISEW by changing some of the main assumptions introduced in ISEW computations.

nef (the new economics foundation) is an independent think-and-do tank that aims to improve quality of life by promoting innovative solutions that challenge mainstream thinking on economic, environment and social issues. nef developed the Happy Planet Index (<http://www.happyplanetindex.org>) which reveals the ecological efficiency with which human well-being is delivered around the world. The HPI reflects the average years of happy life produced by a given society, nation or group of nations, per unit of planetary resources consumed. It combines 3 separate indicators: ecological footprint, life satisfaction and life expectancy.

Among CEECEC case studies, an interesting example comes from the case of Mendha Lekha in India, developed by the Centre for Science and Environment (CSE) (Singh, 2010b). Mendha Lekha is a small tribal village in Maharashtra that represents a success story in community resource management. The concepts of 'the GDP of the Poor' (introduced in the TEEB project, 2008), and 'Gross Nature Product' often used by the CSE are very well illustrated in this case study, since villagers have managed to keep their economy relatively free of monetization. The author points out that they are certainly poor in money terms and also in terms of material possessions; therefore their economy is not adequately measured in GDP accounting, and as such is better understood through the use of alternative measures of well-being. Destruction of their sustainable livelihoods through loss of access to forest of new dams, or through water pollution from mining (to give examples from other parts of India).would not be adequately reflected in GDP figures.

3.3 Cost-benefit analysis and economic valuation

Cost-benefit analysis (CBA) is frequently used in support of infrastructure construction, mining or industrial projects. Nevertheless, somewhat paradoxically, CSOs have begun using this tool to demonstrate the inappropriateness of projects and to argue against them. In this context, economic valuation can be a useful approach to support CSO work, mainly as a way to convey important messages in a language (monetary value) that is easily understandable by many people, including decision-makers and the general public.

CEECEC CSO partners Sunce, Endemit and A Sud all cite the need for thorough cost-benefit analyses, including all social costs and benefits to demonstrate the inappropriateness of plans and projects that they contest. Sunce, the Association for Nature, Environment and Sustainable Development, Croatia calls for the application of economic valuation methods (contingent valuation, and travel-cost method) to assess the best path for the design of sustainable tourism in the Lastovo Islands in Croatia (Jakl, 2009). They highlight that these methods should be complemented by other approaches and integrated into a broader multi-criteria evaluation context. Endemit, Ecological Society, Serbia, analyses the costs and benefits arising from the construction of a large dam on the Danube (Macura et al., 2010). They argue that if a CBA had been carried out, modified in line with the John Krutilla's rule (Krutilla, 1967), the non-use option value of keeping an irreplaceable natural area with a rich cultural heritage intact would have been taken into account in the decision making process. A Sud - Ecologia e Cooperazione, Italy, also refers the use of CBA in the conflict that arose in Val di Susa near Torino due to the proposed construction of a tunnel for the High Speed Transport Infrastructure (TAV) in Italy (Greyl, 2009). A grass-roots movement – the *NO TAV movement* – echoes the voice of the Susa Valley population against the construction of the tunnel using the results of a CBA performed by an academic to show that the TAV would not be an advantageous alternative to the existing railway and road transport system. The estimations of costs and benefits took into account socio-economic and environmental impacts.

The application of CBA in the context of ecological economics can be relevant to environmental conflicts, as it takes into account estimates of environmental externalities (positive or negative), while at the same time pointing out conceptual difficulties in assigning money values to non-market goods and services, and in choosing one particular discount rate.

Economic valuation of ecosystem services is an approach that has gained widespread dissemination and attention in the past few years due to its increasing (and at times, controversial) uptake by CSOs in collaboration with research institutions to promote conservation of natural areas and support decision making processes. This approach is also used as a basis for the application of biodiversity conservation instruments such as Payments for Ecosystem Services (PES) (section 3.6).

The Natural Capital Project is a joint venture whereby Stanford University, University of Minnesota, The Nature Conservancy and the World Wildlife Fund have developed tools for quantifying the values of natural capital in clear,

credible, and practical ways. The rationale for this project is the acknowledgement that in promising a return (of societal benefits) on investments in nature, the scientific community needs to deliver knowledge and tools to quantify and forecast this return. InVEST is a family of software-based tools for Integrated Valuation of Ecosystem Services and Tradeoffs that enables decision-makers to quantify the importance of natural capital, to assess the tradeoffs associated with alternative choices, and to integrate conservation and human development (<http://www.naturalcapital.org>). InVEST tools are being used in several different places around the world, such as Sierra Nevada (California, USA), Upper Yangtze River Basin (China), Hawaiian Islands (USA), Sumatra (Indonesia), Northern Andes and Southern Central America (that includes Colombia, Equador, Venezuela, the northern tip of Peru, Panama, Costa Rica and the southern tip of Nicaragua) and the Eastern Arc Mountains, Tanzania.

3.4 Languages of valuation and post-normal science

Acknowledgement of the limitations and risks associated with the adoption of a single language of valuation, such as economic valuation, in discussing sustainability issues had led to the application of approaches where multiple values and perspectives are taken into account. Only by allowing the expression of different languages of valuation it is possible to capture the multiple viewpoints and values at stake in sustainability problems and to handle the complexity of socio-ecological systems. Also, the adoption of a strong sustainability approach requires the separate accounting of different capital stocks, thus requiring the adoption of multiple languages of valuation. Approaches and tools such as multicriteria analysis, visioning and participation may be used for this purpose.

Several CEECEC case studies illustrate and refer to the use of these concepts in CSO work. Again, the TAV case study developed by A Sud - Ecologia e Cooperazione (Greyl, et al., 2009), provides a good illustration for this purpose. This case explores the motives and rationale of opponents and proponents, highlighting the role of power relations and an underlying clash of ideologies, and suggesting how tools and concepts of ecological economics might be applied to support alternative proposals from civil society. These include a social multicriteria evaluation (SMCE) including different decision criteria that could be used to demonstrate the plausibility of alternatives to current plans for the development of the TAV.

Sunce, Association for Nature, Environment and Sustainable Development, Croatia suggests that visioning, scenario building and social multi-criteria evaluation are tools that could help decision making on development options. These evaluations could also be used as part of the consultation process for the development of management plans for Protected Areas (Jakl, 2009).

The Centre for Environment and Development, Cameroon (a FoE International member organization), highlights that in Southern Cameroon, the languages of valuation used by local populations are diverse. Most of the time, it is not the language of Western conservation (e.g. biodiversity protection) nor it is the one of standard economics (e.g. monetary compensation): local populations use the languages of defense of human rights, urgency of livelihood, defense of cultural

identity and territorial rights, and respect for sacredness. They argue that in this context multicriteria analysis can be useful, allowing the comparability of plural values and sometimes helping to reach compromise solutions (Robinson, 2009).

Also, the case of the Manta-Manaos Project described by Acción Ecológica, Ecuador (Bonilla, 2009), illustrates how the existence of different languages of valuation are key to understanding the conflict surrounding this IIRSA project, part of a large network of transport corridors in South America to facilitate exports of raw materials. In this conflict, local knowledge, as legitimate as Western “scientific” knowledge, has been silenced during the planning of the Manta–Manaos project.

Multi-criteria analysis and community participation have been used by Fundación Neotrópica, a Costa Rican CSO dedicated to promoting sustainable development. In the ECOTICOS (Education, Communication, Technical, Institutional and Conceptual Solutions) project, MCA (NAIADE methodology) was used to support the participatory development and evaluation of alternative scenarios for the management plan of Térraba Sierpe Mangrove Reserve in response to a proposal for the construction of a new airport and massive tourism development in the region (Aguilar-González, 2010). This project is the result of a joint collaboration between Fundación Neotrópica, the Centro Nacional de Alta Tecnología, the Universidad de Costa Rica and the Universidad de Cooperación Internacional, from Costa Rica, with the Gund Institute from the University of Vermont and Earth Economics from the USA, and raises the question of how multi-criteria analyses can draw from seemingly oppositional approaches such as biophysical and monetary valuation in a more integrated approach to searching for options for achieving sustainability goals.

The UMICORE case described by VODO (Vlaams Overleg Duurzame Ontwikkeling), Belgium (Meynem, 2009) is an example of a post-normal context, not so much because of the high level of uncertainty involved (even if at first there were uncertainties about the relationship between industrial pollutants and health, the last 100 years of scientific research have radically diminished these), but because there are very high stakes and urgent decisions to be made. VODO has contributed to extending the knowledge base by gathering information and health statistics to demonstrate this link locally (“popular epidemiology”), and through drawing the attention of companies and governments to the accumulation of ecological debt.

A Sud - Ecologia e Cooperazione, Italy, has studied the complex situation of the Waste Crisis in Campania, Italy (Greyl, 2010), looking at debates on the risks from waste incineration and the role of different actors in Italian society in this crisis from activists to the so-called “eco-mafia”. This conflict is presented as a post normal science problem where landscape values, traditional land uses, environmental justice claims, local values and interests and community rights to participate in local decisions on a range of issues at stake, point to the need for a different approach. Moreover, local knowledge and competences have much to contribute to the understanding of the conflict, and need to be considered. Campanian committees and associations have over the years developed robust alternative waste management proposals. However, despite their efforts to engage authorities and other official sectors, authorities have resisted debating

alternative approaches to waste management, instead marginalizing the participation and knowledge of organized civil society.

3.5 Ecologically unequal exchange, environmental liabilities and ecological debt

Ecologically unequal exchange and the disproportionate use of natural resources and environmental space by industrialized countries are the main reasons underlying the claims of the ecological debt movement. This concept was developed by activists from Latin American countries that gathered in the Southern Peoples Ecological Debt Creditors Alliance (APADE, www.deudaecologica.org), and then endorsed by Friends of the Earth International. The notion has also been taken up by non-environmental CSO such as the World Council of Churches (Peralta, 2009) and has led to research on calculations published in academic journals (Srinivasan, et al., 2008). Acción Ecológica in Ecuador has sponsored several international meetings on the Ecological Debt since 1997 within the international confederation of Friends of the Earth and has been very active in the promotion of this concept.

Oilwatch, a resistance network of NGOs that opposes the activities of oil companies in tropical countries, demands a full recognition of the ecological debt as it relates to the impacts of fossil fuel extraction and the need to build it into all future climate negotiations. They argue that climate change is only one part of the ecological debt accumulated by the industrialized countries through their exploitation of resources in the South (Oilwatch, 1997).

The Centre for Environment and Development (CED), Cameroon developed a case study in CEECEC providing a new look at industrial logging in Cameroon, stressing the importance of the ecologically unequal exchange and ecological debt. The notion refers to a typical feature of the Cameroonian wood filière, or commodity chain, namely an extractive and export process characterized by the shift of negative environmental and social impacts onto forest communities and by the appropriation of wealth by Northern industries. Examples of unpaid costs that the North owes to the South with respect to industrial logging are inter alia: (1) unpaid costs of sustainable management of renewable resources – especially the trees that have been extracted/exported; (2) the costs of the future lack of availability of destroyed natural resources; and (3) the compensation or reparation for local damages produced by exports (such as the destruction of forests, fields or graves). Some aspects of the ecological debt defy easy measurement, and although it is not possible to make an exact monetary valuation, it is certainly useful to establish the order of magnitude of damage in order to stimulate political debates and awareness-raising on environmental liabilities.

Environmental liability and ecological debt concepts are also present in the case of the Mining Enclave of the Cordillera del Cóndor studied in CEECEC by Acción Ecológica (Chicaiza, 2010). The Cordillera del Cóndor is an area of extraordinary biodiversity and the ancestral territory of indigenous peoples, but it is exposed to the threat of a number of large-scale copper and gold mining projects. This case describes the mining and mineral extraction activities undertaken by Canadian mining companies in the Ecuadorian and Peruvian Amazon in territory belonging to the Shuar people, with little concern for the

huge amounts of waste that will be created, the use of massive amounts of water and energy, and the destruction entailed by road construction.

In promoting sustainability, VODO was probably the first CSO in Belgium to embrace the ecological debt concept. VODO, in collaboration with ULB, extended the scope of the ecological debt framework by developing a methodology for calculating a local, private ecological debt or environmental liability from one single industrial site. VODO applied the concept of ecological debt to quantify the environmental liability of UMICORE in the suburb of Hoboken, where the company has been operating the world largest precious metals recycling unit for more than 100 years. VODO has combined studies on damage to health and crops in Hoboken and combined calculations on the cost of illness, the value of human life and the economic value of gardening to estimate the amount that the company owes to the environment and nearby residents, showing the policy relevance of the ecological debt concept on a local scale. This approach can be used anywhere in the world where private companies are externalizing some of their costs to the environment and surrounding people, who are often vulnerable, lack political power or economic might to defend themselves against a large company causing damages to them. Calculating the ecological debt on a local scale provides a tool for putting more pressure on companies and/or governments to do something to 1) stop the creation of external costs and 2) demand compensation for damages incurred.

According to VODO's experience, the main challenges in applying this concept are determining the scope of the research and the rather high dependence on existing data, which are rarely perfect or complete. Its application is likely to cause conflict with any given company, who will most likely manufacture uncertainty by disputing any result that includes figures for damages if the cause-effect relationship is not yet established by the scientific community or the government. The challenge is to put as many existing data, sources and evidence together in a coherent way that at least provokes sufficient concern to get the attention of authorities, scientists or lawyers who are ready to take the issue more seriously.

3.6 Economic instruments for environmental policy

CSOs have in some circumstances advocated the use of market-based environmental policy instruments as a way to associate the attainment of environmental objectives, or the protection of natural areas, with the payment of compensation to local communities.

WWF has been very active in this field by promoting the application of payments for ecosystem services (PES) schemes that reward those people whose land provides ecosystem services with payments from those who benefit from them. Ensuring payments for the benefits provided by forests, coral reefs and other natural ecosystems is seen as a way to recognize their value and ensure that these benefits continue well beyond present generations (<http://www.worldwildlife.org>). WWF has participated in the development of PES schemes in many different places (such as Guatemala, Tanzania, Indonesia, the Danube River Basin) and with different partners, from local level organizations to international ones, such as IIED and CARE. The Natural

Capital Project described in section 3.3 is a partnership where WWF is involved in developing baseline information for the application of PES schemes.

The application of a PES scheme at the community level is illustrated in the case study of the Himalayas, described by the Centre for Science and Environment, India in the CEECEC Handbook, where in order to preserve a small dam, a downstream village decided many years ago to pay an upstream village to cease the grazing that caused soil erosion and the accumulation of silt (Singh, 2010c).

REDD (Reducing Emissions from Deforestation and forest Degradation) is another scheme that recognizes the value of carbon stored in forests, offering incentives for developing countries to reduce emissions from deforestation and invest in low-carbon paths to sustainable development. The idea is that developed countries should fund developing country initiatives aimed at reducing deforestation. REDD+ is an extension of REDD that goes beyond deforestation and forest degradation to include biodiversity conservation and support to poor local communities. REDD is an example of the application of the PES concept at the international level.

The CEECEC case study in Mato Grosso, developed by Instituto Rede Brasileira Agroflorestral, Brazil (Andrade and May, 2009) seeks to describe how potential benefits for social and environmental conditions in the humid Amazon tropics might be captured by a combination of policy instruments under development aimed at compensating for conservation of remaining forests through PES. Under such a scheme, payments for REDD would be channeled toward the expansion and structuring of a state system of protected areas in Mato Grosso, Brazil. Specifically, the objective of this case study is to evaluate the potential for deforestation reduction and compensation of legal reserves in new protected areas under proposed state ecological-economic zoning.

The application of market-based approaches, such as tradable carbon emission permits, CDM (clean development mechanism) and REDD in climate change policy have been the object of strong contestation from activist movements and CSOs. These movements have led to the creation of the Durban Group for Climate Justice in 2004, followed by the broader-based Climate Justice Now! Movement in 2007 (<http://www.durbanclimatejustice.org>) that issued the Durban Declaration on Carbon Trading rejecting the claim that carbon trade will halt the climate crisis. The main justification for the rejection of such schemes is the idea that they legitimize the maintenance of status-quo and allow industrialized countries and industries to continue business as usual and avoid emissions cuts at home. The underlying arguments of the climate justice movement are very close to the notions of ecological debt and unequal ecological exchange presented in section 3.5. Apparently, such concepts have also emerged in the academic literature but gained wider momentum and projection through its use by environmental activists and environmental justice movements (Roberts and Parks, 2010).

3.7 Resilience and co-management of natural resources

Community based management, co-management and joint forest management are related concepts that refer to forms of cooperation in management of natural resources where dialogue and discussion among the interested parties

are key elements. Social justice, democracy and trust are also at the core of these approaches to natural resources management.

The concept of participatory forest management is illustrated in the CEECEC case study of Mendha Lekha, India (Singh, 2010b). Mendha Lekha is small tribal village in Maharashtra, relying on the good management of the commons for their livelihood. This village is a microcosm of tribal life that has managed to preserve its forest over the years using an exemplary “self-rule” principle, which is central to their existence. Mendha achieved this feat through three pivotal rules, self study, self governance and participatory democracy using a consensus approach. The case fits with the critiques by CSO and by academics (such as Bromley, Ostrom and many others) against the facile generalizations of the misnamed “tragedy of the commons” put forward by Hardin in his famous 1968 article in Science.

The above mentioned case of Hiware Bazar, Maharashtra, India that focuses on successful water harvesting and new institutions for water use in a village much more integrated into the market than Mendha Lekha, also illustrates the concepts of village-based management of natural resources.. Singh (2010a) highlights the importance of the Gram Sabha (village council), a pivotal institution deciding everything from identifying sites for water harvesting structures to dividing water and forbidding certain crops by consensus. The village is community driven and the use of government programmes is decided by the community. Hiware Bazar's achievement is special as it managed to profit so well from the public employment subsidies (now extended in India under the NREGA programmes).turning them into successful environmental investments.

In the Lastovo Islands (Croatia) case study in CEECEC (Jakl et al, 2009) we can see an application of two concepts of ecology, carrying capacity and resilience, to discuss the number of nautical tourists that should be allowed in the area. Resilience means that ability of a system to absorb a shock without turning into a new system.

Finally, the concept of resilience management is at the core of WWF's Climate Change LEADS (Linking Environmental Analysis to Decision Support) Project (<http://www.worldwildlife.org/climate/florida/item8978.html>) that was designed to explore and improve the resilience of south Florida's coral reef systems to climate change. The project is engaging reef neighbors and users, marine and social science professionals, natural resource managers, and decision makers at the local, state and federal levels to explore the relationships between local environmental conditions (water quality, local temperature variation, etc.) and coral bleaching. The goal is to develop management strategies and policy recommendations to enhance resilience with the input and support of stakeholders.

4. Discussion

Table 1 presents a mapping of the use of ecological economics concepts and tools in CSO work, summarizing the examples described in section 3, allowing for a general overview of the use of the different ecological economics concepts and associated tools in environmental activist action. The case studies

developed in the scope of the CEECEC project have touched upon all the different categories of concepts, although with different emphasis and depth – some cases describe the actual application of the tools and concepts, and the results obtained, while others discuss their potential application to a conflict. The cases collected from other sources illustrate the use of ecological economics concepts in on the ground campaigns and activist action worldwide.

It is interesting to note that more technically demanding and data intensive concepts such as resource accounting tools or indicators of well-being, are mostly used or promoted by larger CSOs like Friends of the Earth or WWF, or by joint efforts between CSOs and academic/research institutions. Smaller civil society organizations tend to focus more on the work with local communities, to which they are more closely related to than larger organizations, and in activist action on issues at the local/national level, applying approaches more targeted to these activities (e.g. community participation, co-management of resources, payments for ecosystem services, and demands for corporate accountability).

CSO members that participated in the online course in ecological economics organized in the scope of CEECEC stated their expectations regarding the use of concepts and tools in their final evaluation of the course. Concepts such as incommensurability of values, languages of valuation, economic valuation, ecological debt, social metabolism and weak and strong sustainability were deemed as very interesting/useful to frame the debates and activist action. The tools/instruments that were considered to be more potentially useful in the future were those of cost benefit analysis, multi-criteria evaluation, payments for ecosystem services, material flow analysis, ecological footprint, HANPP and participative decision making.

The underlying assumption of CEECEC is that CSOs have accumulated large stocks of 'activist knowledge', which sometimes becomes available to academics, and vice-versa, some concepts and methodologies developed within the science of ecological economics are useful in practice to environmental NGOs (Martinez-Alier et al., 2010). The examples collected herein illustrate this idea of two-way communication between science and activist knowledge in sustainability issues.

The ecological footprint, water footprint and the ISEW are good examples of ideas that were borne in academic domains and have had a major uptake and reached wider public dissemination through civil society action. This widespread societal application of scientific concepts and tools has fostered their further conceptual development (see for instance the development of guidelines for calculation of ecological footprints) in a sort of co-evolutionary process between science and environmental activism. Instead, Material Flow accounting, or HANPP calculations, although very active domains of academic research in social metabolism and socio-ecological transition studies, have been less popular with CSOs.

On the other hand, concepts like the ecological debt and unequal ecological exchange either have their roots or their main "takers" in activist movements and have only recently been reflected in scientific literature (Martinez-Alier et al. 2010; Roberts and Parks, 2010). For example, the application of analytical tools from ecological economics, namely resource accounting and economic valuation, in the study published by Srinivasan et al. (2008) in the Proceedings

Table 1 – Application of ecological economics tools and concepts in CSO work

CEECEC Case Study	Categories of ecological economics concepts and approaches							Handbook chapter/Source
	resource accounting tools	national well-being accounts	CBA and economic valuation	languages of valuation and post-normal science	ecological distribution conflicts	environmental policy instruments	resilience and co-management	
Accion Ecológica, Ecuador - Manta-Manaos project				x				1
A Sud, Italy - TAV in the Susa Valley			x	x				2
Accion Ecológica, Ecuador - The Mining Enclave of the Cordillera del Condor					x			3
CSE, India - Mendha Lekha		x					x	5
Centre for Environment and Development, Cameroon - Forestry and Communities				x	x			6
UAB - Kenya's Tana Delta	x							7
CED, India - Hiware Bazar	x						x	8
Sunce, Croatia - Lastovo National Park			x	x				9
Endemit Ecological Society, Serbia - Local Communities and Protected Areas in Serbia			x					10
CSE, India - PES in India						x		11
REBRAAF, Brazil - REDD in Mato Grosso						x		12
A Sud, Italy - Waste crises in Campania				x				13
VODO, Belgium - UMICORE case				x	x			14
Other CSOs								CSO website
Friends of the Earth	x	x			x			http://www.foe.co.uk/
Via Campesina	x							http://viacampesina.org/
Fundación Neotrópica				x				http://www.neotropica.org/
new economics foundation		x						http://www.neweconomics.org/
Oilwatch					x			http://www.oilwatch.org/
Global Footprint Network	x							http://www.footprintnetwork.org/
WWF	x					x	x	http://wwf.panda.org/
Water Footprint Network	x							http://www.waterfootprint.org/
Natural Capital Project			x					http://www.naturalcapital.org/
Southern Peoples Ecological Debt Creditors Alliance					x			http://www.deudaecologica.org/
World Council of Churches					x			http://www.oikoumene.org/
Durban Group for Climate Justice						x		http://www.durbanclimatejustice.org/

of the National Academy of Sciences of the USA has reinforced the arguments of ecological debt movements.

Some of the collected cases (e.g. the Natural Capital Project and the ECOTICOS project) also show very clearly the benefits of the joint collaboration between CSOs and research institutions. Long-term collaboration in these cases has fostered robust application of the concepts, stakeholder engagement, capacity building and effective community action. These cases provide inspiring examples for the future development of ecological economics.

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