



VIEW POINTS OF AN ECOLOGIST ON PRACTICAL ENVIRONMENTAL ETHIC: SOCIO-ECOLOGY, COMMON-POOL RESOURCES AND CONSERVATION

PUNTOS DE VISTA DE UN ECOLOGO SOBRE ÉTICA AMBIENTAL PRÁCTICA: SOCIO-ECOLOGÍA, RECURSOS DE ACCESO COMÚN Y CONSERVACIÓN

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SUMMARY:

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The paper centers on environmental practical ethic point of views according to a professional ecologist. Ecology and the science of Socio-ecology are defined. The framework of the Millennium Ecosystem Assessment initiative (MA 2003), including the use of ecosystems as the environmental unit of analysis, ecosystem services and human well-being as the center for assessment are discussed. Common-pool resources (CPR) and the allegory of the tragedy of the commons are used to illustrate main scientific and ethical environmental approaches, and above all to highlight the case of climate change, considering "air-atmosphere" as a CPR. The need to adopt practical personal environmental ethical positions is highlighted. Furthermore, on climate change, a discussion on the need to develop environmental and socio-ecological polycentric approaches: top-down and bottom-up, is included. An updated discussion on the concept of conservation, including main scientific and ethic points of view, is presented. Pope Francis's Encyclical, *Laudato Si'*, is used to highlight environmental, socio-ecological and ethical aspects behind the comprehensive concept of Integral Ecology. The paper ends with a short synthesis on Earth modern unseen and astonishing environmental and socio-ecological rates of changes, and identifying the main barriers for personal environmental engagement. A call is done regarding the urgent need for socio-environmental ethic personal engagement and collective actions.

RESUMEN:

Palabras clave:

Ambiente; Socio-ecología; Recursos de acceso común; Cambio climático; Conservación; Barreras.

El trabajo está centrado en torno a puntos de vista éticos ambientales prácticos de un ecólogo profesional. La Ecología y la ciencia de la Socio-ecología son definidas. El marco de referencia de la iniciativa Millennium Ecosystem Assessment (MA 2003), incluyendo a los ecosistemas como unidades de análisis ambiental, los servicios ecosistémicos y el bienestar humano, como el centro de las evaluaciones son discutidos. Los recursos de acceso común (RAC) y la alegoría de la tragedia de los comunes son usados para ilustrar las principales aproximaciones ambientales científicas y éticas, y en especial para destacar el caso del cambio climático, considerando al "aire-atmósfera" como un RAC. La necesidad de adoptar posiciones prácticas éticas

ambientales es destacada. Además, en relación con el cambio climático, se presenta una discusión sobre la necesidad de desarrollar estrategias ambientales y socio-ambientales de tipo policéntricas: de arriba hacia abajo y de abajo hacia arriba. Adicionalmente, se entrega una discusión actualizada sobre el concepto de conservación, destacando las principales aristas científicas y éticas. La Encíclica del Papa Francisco, *Laudato Si'*, es usada para resaltar aspectos ambientales, socio-ecológicos y éticos contenidos en el concepto de Ecología Integral. El trabajo finaliza con una síntesis corta sobre las enormes y nunca antes experimentadas modernas tasas de modificaciones ambientales y socio-ecológicas en el planeta y con la identificación de las principales barreras que impiden una conexión y enganche verdadero y profundo de las personas con el socio-ambiente. Se realiza un llamado urgente en relación con la necesidad de sobrepasar dichas barreras y desarrollar acciones éticas ambientales tanto personales como colectivas.

1. Introduction

An ecologist interested to study and understand the structure, dynamics, complexity and resilience of a particular Earth system or ecosystem (land, fresh water, oceans, atmosphere, other), and build practical bridges with ethic (natural as well as socio-ecological environmental ethic), needs to define, take positions and tell apart a few critical matters. Among many other, a), scientific, as for instance: hypotheses, methods of analysis, direct cause effects, complex non-lineal relations, observational versus experimental approaches; b) philosophical, as for instance: the meaning of the concept of "Nature", that as J.S. Mills discussed in his essay on *Nature*, either can be understood as everything that actually exists, including human beings, and everything humans may create; or, alternatively, the world out there, apart from humans¹; c) ethical and/or moral, as for instance regarding management and conservation practices, to adopt biocentrism or anthropocentrism views; utilitarian, hedonist or preference utilitarian approaches. Moreover, if personally needed, religious positions, as it will be for example, if according to the Cristian Cosmvision, human beings were created to "dominate" other creatures; or alternatively to "stewardship" them².

It seems to me that following the above, for instance, even at a basic ecological level (not to say from an environmental ethical point of view), there exist disa-

greements about the meaning of the words/concepts, "natural" "wilderness", "pristine" and, in the context of attitudes and values, regarding "harm". Harm for whom? In fact, according to many conservationists and ecologists, "pristine", "natural", "wild" ecosystems will be those that have not been influenced by humans, including species introduced in ecosystems deliberately (e.g. aquaculture, agriculture, forestry) or inadvertently; while, the other view of the world is that those concepts are just human constructs³. This is one of today's hot controversies in ecological science and environmental ethics⁴. Furthermore, from ecological and environment ethical point of views, another disputed concept is that of conservation. What really conservation means in view of advanced knowledge in Ecology and socio-ecological sciences, and above all in view of the state of the planet? We live in continuing evolving complex environment and social systems, including ethical and moral, and perhaps what we should understand for conservation is also a continuous evolving concept. Or not? Additionally, and linked to above, is the never ending discussion about nature's intrinsic versus instrumental values⁵.

3 Cronon, W. «Introduction: in search of nature». In: *Uncommon Ground*, Norton, New York, 1996, 23-56.

4 See: Simberloff, D. «Nature, natives, nativism, and management: worldviews underlying controversies in invasion biology». *Environmental Ethics*. 2012; 34: 5-25; Kareiva, P., Marvier, M. «What is conservation science?». *Bioscience*. 2012; 62: 962-969; Soulé, M. «The new conservation». *Conservation Biology*. 2013; 27: 895-897; Tallis, H., Lubchenco, J. «A call for inclusive conservation». *Nature*. 2014. 515: 27-28.

5 See: Justus, J., Colyvan, M., Regan, H., Maguire, L. «Buying into conservation: intrinsic versus instrumental value». *Trends in Ecology and Evolution*. 2008; 24: 187-191; Jamieson, D. *Ethics and the Environment*. Cambridge University Press, Cambridge, 2012.

1 Singer, P. *Practical Ethics*, Cambridge University Press, New York, 2011, 4-5.

2 Francis, *Carta Encíclica Laudato Si', Sobre el Cuidado de la Casa Común*, Salesianos Impresores, Santiago de Chile, 2015.

Regarding the presence and interference of human beings in nature, Robert T. Paine, a world class experimental marine ecologist, put it this way: "Human activity has probably influenced all environments and species. In this sense no truly pristine situations remains, and will become increasingly altered by stress steaming form such direct impacts as exploitation or point-source pollution, or more subtle and less direct effects of global warming, changes in the concentration of atmospheric gasses, the elevation of sea level, or the destruction of the ozone layer"⁶.

If the above is true, and I believe it is, then not only pure scientifically driven ecological approaches, but concomitantly also the analysis of integrated human and nature socio-ecological systems, and moreover regarding environmental justice, should demonstrate to be critical. For instance with regards to ecosystem dynamics, resource uses and resilience (natural resilience: the amount of disturbance a systems can absorb and still remain within the domain of attraction; social resilience: the self-organization capability of a system, and its capacity for learning and experimentation⁷), and concordantly help to bridge that to practical environmental ethics.

The main objectives of this paper are: a) to further explore the paradigm showing that the analysis of ecosystems needs to incorporate humans; and, in that doing so a way to approach ecosystem studies is via the analysis of ecosystem services for human well-being⁸, b) to use examples of Common-pool resources (CPR) to show how to bridge practical approaches to management and environmental ethics, c) to discuss conservation of the environment in view of the co-occurring and linked environmental and social crises, d) to explore the main reasons behind the extremely reduce individual and collective environmental ethic actions, and the urgent need for personal engagement.

6 Paine, R.T. «Marine Rocky Shores and Community Ecology: An Experimentalist's perspective», in: *Excellence in Ecology 4*, Kinne O. (ed.), Ecology Institute, Oldendorf/Luhe, 1994, 1-152.

7 See: Holling, C.S. «Resilience and stability of ecological systems». *Annual Review of Ecological Systematics*. 1973; 4: 1-23; Berkes, F., Seixas, C.S. «Building resilience in lagoon social-ecological systems: a local-level perspective». *Ecosystems*. 2005; 8: 967-974.

8 See: Millenium Ecosystem Assesment (MA). *Ecosystems and Human Wellbeing*, Island Press, London, 2003.

2. The environment seen from the socio-ecological point of view

Ecology as a science can be defined as: the scientific study of all organisms (humans included) and dynamic interrelationships among and between them, along scales, and all aspects, living or non-living, of their environment. On terms, the science of human socio-ecology is a modern transdisciplinary and intersectorial activity acknowledging that modern global changes due to human activities represent profound alterations of systems, ecosystems and services and that Earth systems are in transitions, and mainly, but not exclusively, focuses on studies facing the challenger of human sustainable development. According to Carpenter *et al.*: "The challenger of sustainable development is to grasp this opportunity [= our expanding understanding of changes in human socio-ecological systems and our capacity for action] and transform social-ecological systems to provide food, water, energy, health and well-being in a manner that is economically, ecologically and socially viable for many generation in the future and for people in all parts of the world"⁹. It is my view that one of the first truly and long-term world transdisciplinary efforts to address human socio-ecological approaches, with a strong accent in environmental ethics, is the Millennium Ecosystem Assessment Program¹⁰. The MA Program was launched by the United Nations Secretary-General, Kofi Annan in June 2001, congregated over a thousand specialists of 100 nations that worked (2001-2004) analyzing intersectoral solutions and guiding models for human socio-ecological challengers, taken into account environmental ethical approaches; and surely taken position regarding them. "The MA focused on how changes in ecosystems [this was the natural unit selected] services have affected human well-being, how ecosystem changes may affect people in future decades, and what types of responses can be adopted at local, national, or global scales to improve ecosystem management and thereby contribute

9 Carpenter, S.R., Folke, C., Norstrom, A., et al. «Program of ecosystem change and society: an international research strategy for integrated social ecological systems». *Current Opinion in Environment Sustainability*. 2012; 4: 134-138.

10 Millenium Ecosystem Assesment (MA), *op. cit.*

to human well-being and poverty alleviation"¹¹. In the heart of the MA is stated that main freedom and choices determinant and constituents of human well-being are: security, basic material for a good life, health and good social relations. The MA approaches and the central model¹² were based on three key concepts: Ecosystem, Ecosystem Services (Provisioning, Regulating, Cultural, and Supporting) and Human Well-being at the center of the proposal. Regarding this conceptual framework, and in connection with some of the questions risen in the introduction of this paper; for instance, on addressing ethical positions on nature's (biodiversity) intrinsic versus instrumental values; the MA stated that: "The conceptual framework for MA places human well-being as the central focus for assessment [instrumental anthropocentric value; added by author], while recognizing that biodiversity and ecosystems also have intrinsic value and that people take decisions concerning ecosystems based on considerations of well-being as well as intrinsic value"¹³. The MA approach aims to integrate wide intersectoral research (exact, natural, social and humanity sciences) on stewardship of socio-ecological systems and the services they generate for human beings.

The MA approach represents a new scientific, as well as ethical approach that has been widely used around the world. Institutions such as the World Bank, The Nature Conservancy and World Wildlife Fund have implemented projects on line with the MA approach, in cases based on the so called "market based instruments" aiming to protect ecosystem services and biodiversity¹⁴. In the literature there is concern about some ethical considerations regarding the on-ground application of the ecosystem services approach¹⁵. Indeed, the ecosystem services approach has an anthropocentric framing; and surely, equity, motivations and socio-cultural impacts needs to be taken into account. Nevertheless,

it appears to be a serious mistake to criticize the MA approach exclusively under the monetary valuation and commodification optics. There are many examples in which MA approaches have succeed without recurring to commodification or monetary valuations or using mix approaches, and it continues to be a valid ecosystem's assessment instrument¹⁶. Nevertheless, as pointed out by Matulis¹⁷, there are several social and environmental justice reasons, so to be cautious of the economic valuation of nature.

The new initiative, Program on Ecosystem Change and Society (PECS), aiming to integrate research on stewardship of socio-ecological systems, the services they generate, and the relationships among natural capital, human well-being, livelihoods, inequality and poverty, may be seen as a continuation of the MA¹⁸.

In the same vein, Pope Francis' Encyclical *Laudato Si'*¹⁹ has received considerable world attention, mainly for his courageous and clear call for urgent adoption of steps to control climate change, one of the socio-ecological more critically affected Earth system (see details below). In this sense the Encyclical follows the IPCC (2014) report that indicates: "The IPCC is now 95 percent certain that humans are the main cause of current global warming. In addition, the SYR [Synthesis Report] finds that more human activities disrupt the climate, the greater the risk of severe, pervasive and irreversible impacts for people and ecosystems, and long-lasting changes in all components of the climate system"²⁰. Nevertheless, the beauty and power of the Encyclical is that not only calls attention to that, but that in doing so makes a direct cause-effect link between climatic changes (and other environmental problems) and social inequities, social

11 *Ibid.*

12 See: Carpenter et al., *op. cit.*

13 Millenium Ecosystem Assessement (MA), *op. cit.* 7.

14 Kareiva, P., Chang, A., Marvier, M. «Development and conservation goals in World Bank projects». *Science*. 2008; 321: 1638-1639.

15 Luck, G.W., Chan, K.M.A., Eser, U., et al. «Ethical considerations in on-ground applications of the ecosystem services concept». *BioScience*. 2012; 62: 1020-1029.

16 See: Kareiva et al., *op. cit.*; Marin, A., Gelcich, S., Castilla, J.C. «Ecosystem services and abrupt transformations in a coastal wetland socio-ecological system: Tubul-Raqui after the 2010 earthquake in Chile». *Ecology and Society*. 2014; 19. dx.doi.org/10.5771/ES-05633-190122i; McCauley, D.J. «Selling out nature». *Nature*. 2006; 443: 27-28.

17 See: Matulis, B.S., «Economic valuation of nature». *Ecological Economics*. 2014; 104: 155-157.

18 See: Carpenter et al., *op. cit.*

19 Francis, *op. cit.*

20 Intergovernmental Panel on Climate Change (IPCC). «Climate Change 2014: Impacts, Adaptations, and Vulnerability». *IPCC WGII ARS Summary for Policy Makers*, March 2014. <http://www.ipcc.ch/report/ar5/wg2/>.

justice, over-consumption, neo-liberal economic models, technocratic paradigms, excess of competition, lack of cooperation, ethical and moral crises (= see Capitalocene Era²¹). Further, there is a call of attention to the fact that devastating damages to Earth climatic system are directly linked to justice for those suffering and the poor. In the Encyclical is stated that what we are facing is a joint social-environmental crisis; so climate change, pollution and loss of biodiversity, are occurring in parallel with dramatic changes in ways we behave environmentally, and how modern society compete instead of cooperate; for instance, at times in which 10 million of children died per year in poverty. The Encyclical calls to develop an Integral Ecological approach among and between environment, economic and social variables (socio-ecology, see above); aiming for generational justice. In my view, one of the Encyclical more powerful ethical-environmental calls is the reinforcing idea (challenger) that the environment must be situated in a "receptive logic". This is to say, that each generation of human beings receive environment as lend that must be passed to the next generation and that therefore, there is need for intergenerational solidarity. This powerful ethical as well as human socio-ecological end is difficult to be concreted; unless, as pointed out in the Encyclical, it is approached through the development of an Integral Ecology, and by adding basic ethical compromises and looking for common good and welfare.

2.1. *Management and practical ethic view points for the case for common-pool resources and the allegory of the tragedy of the commons*

The struggle for the use and rational management of common-pool resources (CPR) has been recurrently addressed in the literature and involves deep environmental ethic connotations. Hardin's paper²² is a key reference for it, although the paper has been criticized as having oversimplified the situation and suggested as an

unsalable universal problem²³. Above authors, among other, have suggested ways to escape to inexorability leading to the overuse of CPR and overcoming the classic Hardin's tragic allegory. In fact, ways to escape to the tragedy normally involves scientific and/or local ecological knowledge, appropriate communication among users, developing of trust and reciprocity (preference utilitarian approaches), organization, existence of social institutions, rules and appropriate governance settings. These are some of the key scientific and socio-cultural settings enabling collective actions and the eventual arising of ethically rational use and management of CPR. There are four major categories of CPR in need to be analyzed in Hardin's or Hardin's critic optics: a) The Oceans or the Sea, b) Fresh Water Systems, c) Biodiversity, d) "Air-Atmosphere". Typically, around them private property does not (should not) exist and if one follows the simplicity of Hardin` argument, then, in absence of appropriate human institutions and organizations, the allegory of the tragedy may emerged.

Presently, this is the case for all four CPR. Many authors have addressed the rate at which CPR overuse is occurring and associated human tragedies; either due, for example, to human population exponential growth and/or lack of regulations. Recently, I have done so regarding climate change²⁴ (Castilla 2015), stressing that indeed "air-atmosphere" is a category of CPR, where private property does not exist and that global warming of the planet, generated by human activities at an ever increasing rate (mostly due to a consumerist society) has stored in the high atmosphere unseen amounts of greenhouse gases, stressing Earth systems. We have failed in giving us institutions and governance coping with climate change. In short, it seems to me that the following is the ethical approach to be followed: "Individuals must think of themselves as inclusively ac-

21 Altwater, E. «El Capital y el Capitaloceno». *Mundo Siglo XXI*. 2014; 33: 5-14.

22 Hardin, G. «The tragedy of the commons». *Science*. 1968; 162: 1243-1248.

23 See: McCay, B.J., Acheson, M. *The question of the Commons: The Culture and Ecology of Communal Resources*, University of Arizona Press, Tucson, 1987; Ostrom, E. *Governing the Commons: The Evolution of Institutions for Collective Action*, Cambridge University Press, New York, 1990; Dietz, T., Ostrom, E., Stern, P.C. «The struggle to govern the commons». *Science*. 2003; 302: 1907-1912.

24 Castilla, J.C. «Tragedia de los recursos de uso común y ética ambiental individual responsable frente al calentamiento global». *Acta Bioethica*. 2005; 21: 65-71.

countable for what they do together". "If collective we cause harm, then even though we do not deliberately set out to do something together, and the contribution of a single individual may make no [o little difference] to the harm done, each one of us is complicit in causing the harm and accountable for it"²⁵. The ethical Complicity Principle²⁶ assumes that the individual to be accounted for is aware or have knowledge of the situation, causes and consequences. Knowledge (local ecological knowledge, scientific knowledge), is in the center of complicity. In this sense, in the past decades, environmental scientists as well as international bodies (including IPCC), regional o local organizations had dramatically failed communicating to societies the so call "science of climate change", which is in much need to be "democratized"²⁷. Practical personal and collective ethical pro adverse anthropogenic climatic impacts may include: a) need to access information about the state of the global and local climate situation and impacts; b) need to know the causes, consequences, mitigations and opportunities of climate change scenarios; c) need to give informed opinions; d) need to be aware of personal transport footprint per year and associated greenhouse emissions; e) need to inquire about personal carbon, oil, electrical, heating, greenhouse footprints per year, and ways to reduce them; f) need to be pro-active regarding climate change collective actions, so to incorporate other in taking action; g) need to think collective about climate change and use the Complicity Principle (family, school, university, municipality).

Ostrom²⁸ beautifully captured the central challenge and practical ethical problems of climate change. In Ostrom's polycentric approach for coping with climate

change, the author calls attention on the mistake that has been in the past to focus primarily (almost exclusively) on the need for a global solution (e.g. Kyoto Protocol, 1979, and following COPs meetings), and how that has resulted in the lack of global agreements (-perhaps an exemption are the Paris COP21-2015 agreements). Ostrom highlights that if global solutions are not efficiently backed by a mix of efforts at regional, national, local, community and individual levels, it will be no guarantee for success. Centrally, the author argues that while many effects of climate change are indeed global, the causes are actions undertaken by individuals, families, collectives, companies and all kind of actors at a much smaller scale. The way to go forward must be to take a polycentric approach²⁹ to climate change; this is to say top-down as well as bottom-up initiatives. The effort to reduce global greenhouse gas emissions is a classic individual-collective action problem that is best approach and solved at multiple scales. Aiming to incorporate bottom-up actors into the climate change equation will require as a first step to provide updated communication and out-reaching platforms, so the population has a much better and direct understanding of the climate change situation, aiming to elevate levels of trust, cooperation, reciprocity and complicity.

There have been proposed many other ways to face the climate change tragedy, including ethical considerations, so to reach and engage the population (individual, collectives, particularly youths). For instance, those under the umbrella of the so called "the Gandhian way" or "self-sacrifice way"³⁰, or the use among scientists of "the non-violent civil disobedience"³¹. In my view, the engagement of the population, at different levels or organization, or the bottom-up component of the climate change equation, is one of the 21st century key scientific and environmental ethical challengers.

25 Singer, *op. cit.*

26 Kutz, C. *Complicity: Ethics and Law for a Collective Age*, Cambridge University Press, Cambridge, 2000.

27 See: Hassol, S.J. «Improving how scientists communicate about climate change». *EOS*. 2008; 89: 106-107; Castilla, J.C. «Cambio Climático global y educación: alfabetización, socialización, sensibilización y urgencia», in: *Balance y Perspectivas de la Educación Ambiental en Chile e Iberoamérica*, Arrué, R. (ed.), Comisión Nacional del Medio Ambiente, Gobierno de Chile, 2009, Tomo, 1175-1183.

28 Ostrom, E. «A polycentric approach for coping with climate change». *Background Paper to the World Development Report: Development in a Changing Climate*. The World Bank, Working Paper 5095, 2009, 1-54.

29 See: Ostrom, V. «Polycentricity», in: *Polycentricity and local public economies*, McGinnes, M. (ed.), Ballinger, Cambridge, 1999, 52-74.

30 Gupta, A. «Responding to global climate change: the Gandhian way». *Ethics in Science and Environmental Politics*. 2001; 11: 19-21.

31 Lemons, J. Brown, D.A. «Global climate change and non-violent civil disobedience». *Ethics in Science and Environmental Politics*. 2011; 11: 3-12.

Similar CPR tragedies have been described for the ocean. For instance, numerous sea resources have been over-exploited, due to lack of management, mismanagement, non-regulation and/or irrational management, and resulted in CPR tragedies. Different ways to escape to the tragedy of the common access of resources, in the case of coastal small-scale benthic fisheries, in particular for Latin America, have been reported³². In summary, in this sub-continent, with regards to marine coastal CPR, several management-ethical approaches to escape to the tragedy of the commons have been used and in the past 20 years and there is a story of relative successes. The main management tool used, in whose development I was engaged in Chile³³, has been that of co-management, defined as: "The shearing of management tasks and responsibilities among governments and local users"³⁴, based in organized fisher collective units. This has emerged as a strong and powerful institutional arrangement, so avoiding the traditional two-way Hardin's solution of privatization or full top-down government management control. Ethically, I think that these small-scale fishery collective units are much more close to the ethical Complicity Principle, and/or to the Preference Utilitarianism Principle³⁵, than to any other management-ethical approach.

3. Practical environmental ethics and the case of Conservation

The key question of what scientists and society understand today as "conservation" is a hot one. The present stage of Ecology, as a complex science (naturalistic, descriptive, experimental, modeling, auto-ecology, individuals, species, populations, communities, ecosystems

and biome) is advanced; but still we do not have a holistic Ecological theory. Nevertheless, Ecology is, obviously, much more advanced today than one or two centuries ago, and this calls (in my view) to revisit some old key philosophical and ethical questions, as for instance: What is "nature" in today's world?³⁶ Are humans or not part of it? What is "conservation" under the 21st century socio-ecological, industrial, economic and use and abuse of CPR? Moreover, it may be asked if 19th century Emerson's, Muir's and Thoreau's romantic or even patriotic ethical connotations for conservation can still be hold? Or, if the environmental ethic regarding Earth systems restoration ("a new land ethic") of Aldo Leopold, or the environment views of Engels and Marx during the first decades of 20th century³⁷; or the perceived more extreme distinction done by the philosopher A. Næss³⁸, between "shallow" and "deep" ecology (-the later aiming to "preserve" the integrity of the biosphere-) at the beginning of the Great Acceleration period of modern humanity, do hold today?

Above all, and most importantly, if the answers to those questions should or shouldn't be interweaved with the state of present world society, inequities, poverty and human needs? For instance, with the fact that in planet Earth we reached 7000 million people and that 2200 million of them live with less than US\$ 3 per day. The answer to some of those question will not only guide the way society should scientifically understand conservation (or invest in it), but should signal practical bio and socio-ethical approaches³⁹. The question can also be presented as: why do we conserve nature? In this sense the discussion may be directed towards a dichotomy (false in my view), about conserving and protecting nature for its own sake or intrinsic values or alternatively to serve ourselves, as instrumental values. In this short review I take options and follow the idea championed by Kareiva and Marvier, that "today, one of

32 See: Defeo, O., Castilla, J.C. «More than one bag for the world fishery crisis and keys for co-management successes in selected artisanal Latin American shellfisheries». *Reviews in Fish Biology and Fisheries*. 2005; 15: 265-283; Gelcich, S., Hughes, T.P., Olsson, P., et al. «Navigating transformations in governance of Chilean marine coastal resources». *Proceedings of the National Academy of Sciences*. 2010; 107: 16794-16799.

33 See: Castilla, J.C. «The Chilean small-scale benthic shellfisheries and the institutionalization of new management practices». *Ecology International Bulletin*. 1994; 21: 47-63.

34 Defeo, O., Castrejón, M., Pérez-Castañeda, R., et al. «Co-management in Latin American small-scale shellfisheries: assessment from long-term case studies». *Fish and Fisheries*. 2016; 17: 176-192.

35 See: Singer, *op. cit.*

36 *Ibid.*, 247-255.

37 See: Castilla, J.C. «Conservation and social-ecological systems in the 21st century of the Anthropocene era». *Contributions to Science*. 2012; 8: 11-21.

38 See: Næss, A. «The shallow and the deep, long-range ecology movement». *Inquiry*. 1973; 16: 95-100.

39 See: Kareiva, Marvier, *op. cit.*; Soulé, *op. cit.*

the most important intellectual developments is the recognition that ecological dynamics cannot be separated from human dynamics"⁴⁰. Probably, this is close to the idea of Pope Francisco in *Laudato Si'* with regards to his concept of Integral Ecology.

Practical personal and collective ethical pro-Earth systems conservation may include: a) need to access information about the state of environment (pollution, overexploitation, irrational use, deforestation) of main land, fresh or marine ecosystems and resources around my community, municipality, region, country; b) need to act friendly environmentally, not just regarding iconic but also no-iconic species, populations and communities, that may be at risk; c) need to be environmentally responsibly when buying wild animal products; as for instance fishes, shellfishes, and inquiring about closure seasons, minimum legal size of specimens; d) need to report observed transgressions; e) need to act collectively and with complicity; f) need to recycle; g) need to support and help in the creation and running of parks and green or blue no-take areas.

In short, it appears that we ought to assume reality and face the dynamics of environmental and socio-ecological complex matrices: the "ecological dynamics" cannot be aisled or separated from the "human dynamics"; they are necessarily interwoven. We must face the difficult task to work based on those complex dynamics, and in doing so, for instance for a professional ecologist, sooner or later it will be necessary to take options. Practical ethical options will for instance to advocate for "conservation of nature for itself"; "conservation of nature despite people"; "conservation of nature for people" or "people and conservation of nature"⁴¹. In this sense "conservation for people" will certainly be a more anthropocentrism view of the world; while "conservation from people" will be a more radical biocentrism view of the world. Nevertheless, both options, from a scientific or ethical point of view, are not necessarily irreconcilable with one another. Options need to be kept open and approaches should be based on specific situ-

ation and problem to be solved. In the literature the issues of what is conservation or why to conserve have derived into a disagreeable discussion, precisely because discussants are rather radical in their ethical positions. For instance, on intrinsic (subjective) versus instrumental (rationally objective) values; and a call to avoid such extreme dichotomies in conservation has recently been done by Tallis and Lubchenco⁴².

4. A short synthesis of the state of Earth socio-environmental problems, rates of interferences and the urgent need for personal ethical engagement and collective actions

Earth's systems are dynamic and can be described as evolving living and non-living mosaics, of which humans are part and where, at an ever increased rate, occur dramatic, environmental and socio-ecological transformations⁴³. This is in part due to the exponential increase of human populations: in 1800 the human population reached about 1000 million people and the number of years to duplicate that population was of around 150; while by 1950, with 2500 million people, the number of years for duplication dramatically decreased to 40 years. In 2014 the human population reached 7000 million people, and conservative estimates indicate that population will grow to about 9000 million by 2045, with a rate of increase of approximately 77 million people per year. Nevertheless, above transformations are also connected with *H. sapiens* social, cultural, knowledge, technology and ethical evolving characteristics. For instance, is linked to the use of tools, science, technologies, fast agriculture development, animal domestication, sedentary, consumerism and inequities. As a consequence Earth has already experienced unseen rates of modifications of some environmental variables, that had begun affecting life support and forced, localized or global systems into abrupt and in cases irreversible shifting⁴⁴. A major case in point is

⁴² Tallis, Lubchenco, *op. cit.*

⁴³ Steffen, W., Persson, A., Deutsch, L. «The Anthropocene: from global change to planetary stewardship». *AMBIO*. 2011; 40: 739-761.

⁴⁴ See: Barnosky A.D., Hadly, E.A., Bascompte, J. «Approaching a state shift in Earth's biosphere». *Nature*. 2012; 486: 52-58.

⁴⁰ Kareiva, Marvier, *op. cit.*

⁴¹ Mace, G.M. «Whose conservation?». *Science*. 2014; 345: 1558-1560.

that the global Earth's energy budget has been substantially altered and has caused important modifications to the climate and the oceans. As a consequence, over the last 150 years or so; and particularly after the Second World War; several greenhouse gasses (atmospheric CO₂, methane, water vapor, N₂O, other) had notoriously increased in the high atmosphere, surpassing the 400 part per million concentration, for the first time along the past 800,000 years, and overall mean temperature has increased in about 0.85°C⁴⁵.

Earth is approaching astounding physico-chemical, biological, ecological and social shifting points. For instance, human land-clearing had speedily and greatly intensified during the Great Acceleration, and around year 2000 about 50% of Earth land ecosystems were converted into anthropogenic agriculture systems, or dedicated to urban uses⁴⁶. In heavily Earth populated areas landscape fragmentation is a fact and in cases is approaching critical points, and affecting nearby less impacted sites. On the other hand, undoubtedly, over the last two centuries material, health and living conditions of humanity have been greatly enhanced. Communication, transport, health and education are not minor examples of that.

A straight forward analysis of above short synthesis of modern global changes and rates of impacts and deterioration of Earth systems suggests that our industrialized world and economies, may be described as unsustainable systems⁴⁷. We are certainly not succeeding into the transformation of today's social-ecological systems toward a sustainable development: economically, ecologically and socially friendly and viable for future generations.

Why is that? Why is so little personal practical ethic engagement on environmental issues and concerns?

Why is so little action? Takács-Sánta⁴⁸ asked some of these questions and describes 27 barriers to today's environment concern and engagement. Two main sub-groups are distinguished: a) deficits regarding direct, sensory obtainment of information, b) mental appraisal of the severity and probability of announced treats, as well as responsibility and affectedness. Modern societies have lost much of the previous direct sensory contact with the environment. For instance, world urban populations will increase in about 1750 million of persons by 2030, representing a total of urbanized area of approximately 400,000-500,000 Km². Moreover, the author calls attention that, in general, regarding public attitudes on environmental concerns they appear to be narrowed down to the affective components, involving emotional elements. It appears to be a lacking of the other two elements of attitudes: cognitive and conative or predispositions for changes of behavior. Therefore, it is suggested that most of the population is indeed concerned with the environmental crisis, but that the predominant attitude is rooted basically in affective components. A recent study in the marine environment in 10 European nations, showed that the level of concern is closely associated with the level of informedness, and that the level of trust varies greatly among different information sources, being the highest for academics and scholar publications and the lower for government and industry⁴⁹.

In summary, it is suggested that regarding today environmental concerns in the population, there are several constraints (e.g. environmental justice) and barriers, that individually or in combination, tend to weaken the critical predisposition for changes of behavior or more importantly leading to be engaged and take action. Additionally, regarding the diffusion of environmental values, Matutinovic⁵⁰, based on the Eurobarometer study,

45 Intergovernmental Panel on Climate Change (IPCC), *op. cit.*

46 See: Haberl, H., Erb, K.H., Krausmann, F. «Quantifying and mapping the human appropriation of net primary production in Earth's terrestrial ecosystems». *Proceedings of the National Academy of Sciences*. 2007; 104: 12942-12947; Ellis, E.C., Goldewijk, K., Siebert, S., Lightman, D., Ramankutty, N. «Anthropogenic transformation of the biomes, 1700 to 2000». *Global Ecology and Biogeography*. 2010; 19: 589-606.

47 See: Stengers, I. *In Catastrophic times: resisting the coming barbarism*. Open Humanities Press. London, 2015.

48 See: Takács-Sánta, A. «Barriers to environmental concern». *Human Ecology Review*. 2007; 14: 26-38.

49 See: Gelcich, S., Buckley, P., Pinnegard, J.K., et al. «Public awareness, concern, and priorities about anthropogenic impacts on marine environments». *Proceedings of the National Academy of Sciences*. 2014; 111: 15042-15047.

50 Matutinovic, I. «The prospects of transition to sustainability from the perspective of environmental values and behaviors in the EU 27 and globally». *International Journal of Sustainable Development and World Ecology*. 2012; 19: 1-10.

concluded that the state of the distribution of environmental values in EU and US (environmental values were constructed indirectly from attitudes on environmental issues recorded in opinion polls) shows a weak potential for transition from present world economies, and apparently unsustainable environmental systems, to sustainable ones; for instance, regarding to progresses in the direction of any kind of green economy.

My personal position in these issues is that in most cases today's people key environmental cognitive attitudes, based on beliefs, knowledge and norms are buried by consumerism, globalization and materialism. Being so, we have lost contact with cosmologies, individual and social robustness, local and social ecological, traditions, beliefs, values, cultures, religions and local and collective ethics. We do not assume specific environmental practical ethic compromises, become personally engaged, use environmental complicity, act collectively and above all, we do not take practical environmental actions. It is time to act, and as Pope Francis suggested: our "Common house" needs to be seen under a *receptive logic*; and we must engage into environmental intergenerational solidarity and exercising practical, day to day, proactive socio-ecological ethical behaviors. Every one, in different trenchers, must assume personal ethical responsibilities for it. Scientific linkages between environmental sciences, social and human sciences (socio-ecology) are critical for that.

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