A STEP TOWARDS A REALISTIC ANSWER TO ENVIRONMENTAL PROBLEMS

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> If arguments were in themselves enough to make man good, they would (...) have won very great rewards (...); but as things are (...) they are not able to encourage the many to nobility and goodness.
> Aristotle *Nicomachean Ethics*.

> When politicians, industrialists, and environmentalists run out of practical advice, they often take refuge in appeals for a new vision, new values, a new commitment, and a new ethic. Such calls often ring hollow and rhetorical. This is the crux of the problem of sustainable development, and perhaps the main reason why there has been acceptance in principle, but less concrete actions to put into practice.
> A. M. Selvam, *Chaotic Climate Dynamics.*

The German poet Goethe once pointed out that: "If we want to achieve a living understanding of nature we must follow her example and become as mobile and flexible as nature herself [1]." Shall we adjust social and economic structures to natural systems, re-conceptualize the whole theory of development, or develop environmental 'way of thinking' at the community level to meet basic needs of local populations? In our quest for the better future we have to search for a viable alternative to the present development models, but not for a new utopia. For whilst utopia is only a vision of a world without suffering, without conflict, without poverty and with justice for all, while it is just an intellectual or philosophical exercise, is inoffensive and painless. When it becomes an instrument to convert our wishful thinking into practice, it sacrifices everything and everybody on its way to reach its goal.

Until now, various recommendations to draw together ecologically sound ways of living with the call for a renew growth to alleviate poverty in the developing world scarcely brought the required results. The conjec-

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ture that once the site was designated as a 'nature reserve', its biodiversity was preserved proved shortsighted. The shelter of its legal status did not resolve the problems of land tenures and speculation, or stopped the harmful agricultural activities.

Environmentalists thought that a strong case could be made for conservation based on the local, regional and global value of forests to be incorporated into decisions on "sustainable" management of this important resource. The idea was to help forest dwellers and rural settlers profit from the wilderness without destroying it. Anyhow, in many developing countries, it did not stop the destruction; selective timber harvesting proved costly and inefficient. Ecologically friendly activities such as collecting wild fruits, rubber, nuts (non-timber products), including pharmaceutically active substances either are money-loosing propositions or push some plant species to the brink of extinction. Many of the well-meant "sustainable" programs have been focused exclusively on the alternative activities, like industrial reforestation or intensive multi-crop land use, that might appeal to the healthy self-interest of the local people. However, they missed the real connection between the complex community problems, external market pressures and biodiversity loss. As Pompa and Kaus rightly observed: "All the terracing, green mulching, selective harvesting, field rotation, crop diversity, and reforesting in the world cannot help if the external consumption of natural resources continues to outpace local sustainable practices and to offer economic incentives that out-compete long term conservation benefits [2]."

The overwhelming majority of proposals to conciliate economic progress and quality of life with the necessities of biological conservation have financial incentives attached to them. Until now, disbursement of the funds, public or private, has often been insufficient or sporadic, and frequently derailed. On the one hand, the governmental subsidies (local and national) frequently have been bringing more harm than benefit. On the other, the international fund-lending institutions tend to promote unrestrained development directly threatening biological, ecological and cultural diversity. The aid has also been used by power groups without changing local ideas and uses of the environment. The subsidizing agencies hardly visualized the complex interactions between protection of biodiversity, requirements of development and the community life. Nor have they analyzed the direct connections between the local activities and the possible reduction of deforestation or other environmental pressures. As James and collaborators have pointed out, "governments could safeguard the world's biodiversity with a small fraction of the money they spend on harmful environmental subsidies [3]."

All agree with Aldo Leopold (1949) that "system of conservation based solely on economic self-interest is hopelessly lopsided", yet the question

of financial incentives that can alleviate the poverty, and indicate the alternative to the environmentally damaging practices, has to be addressed promptly. According to some views expressed at the European Conference on the Biodiversity (2004) one of the main reasons for the continuing biodiversity loss has been a market failure to play a fundamental role in halting deforestation and overall environmental degradation. Benefits associated with conserving biodiversity are mainly of use for the society as a whole and most of the time not covered by the market. Many ecosystem functions and services defy monetarization as their contribution to our present and future well-being is unknown or difficult to asses. Most of the non-material life support functions represent "collective goods". Intrinsic values by definition have no price, and many other values, for instance, unpredictable preferences of future generation escape monetary evaluation.

> Freely functioning markets are based on narrow self- interest. The upstream polluter has no incentive to account for the cost he imposes on a downstream user of the river. The non-consideration of such "externalities"—the third party costs—may lead to decisions that are 'wise' for the individual now, but 'unwise' for the society as a whole (and that may also be harmful to the individual). This is a market failure [4].

Conceivably, the monetary valuation can play a supportive role in environmental policy in spite of many objections, but its multiple practical and normative problems have to be considered when using such a method. Even so, the comprehensive approach to conservation of the entire biological diversity requires a strategy that goes beyond economic cost-benefit valuation. A number of proposals, like permits to pollute or transferable development rights are essentially market approaches that set limits on environmentally harmful activities. As observed by Blackman and Harrington (2000) in reference to developing countries, "tradable permits are generally not practical [5]."

Our method does not pretend to price environment by endowing it with market value. What we propose is the direct market out of *environmental improvements*, always when a high reliability measurement of actual state could be ensured: for example, the number of wind turbines. The "conditional carrot" approach using "Principal-Agent" methodology [6] might be the only way to deal with the most serious environmental crisis. In fact, this approach has been already under way in combating pollution, like the opening of high-occupancy vehicle lines or promoting hybrids. However, it poses different optimization problem because initial costumer's decision remains stable over time.

On the whole, the Principal-Agent method (Nature being the Principal *represented by a financial institution*) aims at creating new investment opportunities that will stimulate economic development in the region, benefit local communities and the wildlife. The Agent could be anyone who buys the certificate or, in situations involving reforestation, these certificates could be given free of charge to the inhabitants of a community. Participation means the ownership of corresponding certificates. It also offers transparency in handling conservation funds that may be created from taxes, voluntary contributions, or offsetting environmentally harmful actions. It can be taken for granted that the main problem of any environmental decision is not how to impose additional taxes, but how to use the collected money wisely and effectively. The fund creation offers a more efficient way to improve and protect the environment than spending millions of dollars in organizing panels of experts who conclude (with fuzzy estimation of probabilities) that degradation is caused by human activities.

A different approach with the use of Principal–Agent method has been thought by D'Amato and Franckx (2003). They wrote:

> We have considered there the regulation of a (private or public) agent by an EPA (Environmental Protection Agency).This EPA is constrained to basing its incentive scheme (both rewards and punishments) on environmental performance, and allocate funds to an alternative project with environmental benefits. The private agent can allocate its effort either to environmental protection or to its core task [7].

In any case our approach does not need precise specification of parameters, as the quoted study requires.

It is also known that rural communities in undeveloped countries in most cases have a hierarchical structure controlled by powerful individuals. Some authors see this as a main reason for the failure to stop deforestation of the regions in question. According to our strategy their inhabitants could act positively if sufficiently rewarded. "Good" environmental certificates [8] would recompense planting trees or decreasing pollutant levels. We would like to stress that our method is not aiming at valuation of environmental goods nor would the proposed market lead toward this direction.

The precise optimality of such certificates—*Principal optimization problem*—depends on the given models. After using this method for a while, we can consider more exact models to get precise optimality stemming from the strict application of the Principal-Agent method. It is worth to bear in mind that in modern finance applications often anticipate theories, models and theorems. Usual cost-benefits analysis compares Nash com-

petitive equilibria with collusive ones. The well-known mismatch between these two (depending heavily on parameters chosen) does not have easy solution, and is linked to coalition creation and eventual renegotiation through the theory of repeated games [9].

Our approach is qualitatively different. With the use of certificates of improvements we are able to create the cooperation using the concept of fusion since in the fusion case an agent can make improvements in other agent's land. It can also promote the transfer of technologies or any other form of real cooperation. (In fact, recent conferences on climate change stress the transfer of technologies as one of the most significant part of the future political agenda.) . We should also have in mind that the mathematical analysis of certificates of improvement is not trivial [10]. The good news is that our project can start with the issue of *any* good environmental certificate. Instead of diffuse promises of cutting pollution that could put poor countries (if compromised) back to dark ages, we should consider *bona fide* cooperation, which can be accomplished by properly using Principal–Agent methodology.

NOTES

1 Goethe, J.W. *Morphologie*, (1817), 2002: 53-63.

2 Pompa, Kaus, "From pre-Hispanic to future conservation alternatives: Lessons from Mexico" *PNAS (Proceeding of the National Academy of the Sciences of the United States of America,* May 25, 1999, vol. 96, no. 11: 5982-5986).

3 A. N. James, et al., "Balancing the earth's accounts", *Nature*, 1999: 323-324.

4 Joosten H. and Clark D., *Wise Use of Mires and Peat Lands. A Framework for Decision Making*. Http://www.mirewiseuse.com/content.html. 2002: 138.

5 Blackman A. and W. Harrington, "The use of economic incentives in developing countries: lessons from international experience with industrial air pollution." *Journal of Environment and Development,* vol. 9, no. 1, 2000: 5-44.

6 See: Laffont J. J. and Martimort D., *The Theory of Incentives: The Principal Agent Model*, Princeton: Princeton University Press, 2002.

7 Franckx Laurent and Alessio D'Amato, "Environmental policy as a multi-task principal-agent problem," *Energy, Transport and Environment Working Papers*, 2003.

8 *Good* certificate is meant to stimulate and encourage positive environmental actions like reforestation, restoration, conservation of biodiversity or reduction of pollutants. These certificates can be freely bought by all interested agents.

9 Ray R. "Economic value added: theory, evidence, a missing link", 2001.

10 See: W. Szatzschneider and Teresa Kwiatkowska , "Full cooperation to solve environmental problems using financial markets". *Estocástica: finanzas y riesgo,* vol. 1, no. 2, 2011.