

THE ORIGINS OF THE EARTH AND MAN

Oasis Ecosystem | Project to combat desertification
and for management of water resources

Lake Turkana, Loiyangalani, Marsabit County, North Kenya

by Lorenzo Vallerini



This book is the result of the studies carried out in the Department of Architecture, University of Florence.

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A view of Lake Turkana, approaching from Mt. Kulal (photo: L. Vallerini).

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Along the Lake Turkana going to the south.
(Photo: L. Vallerini)

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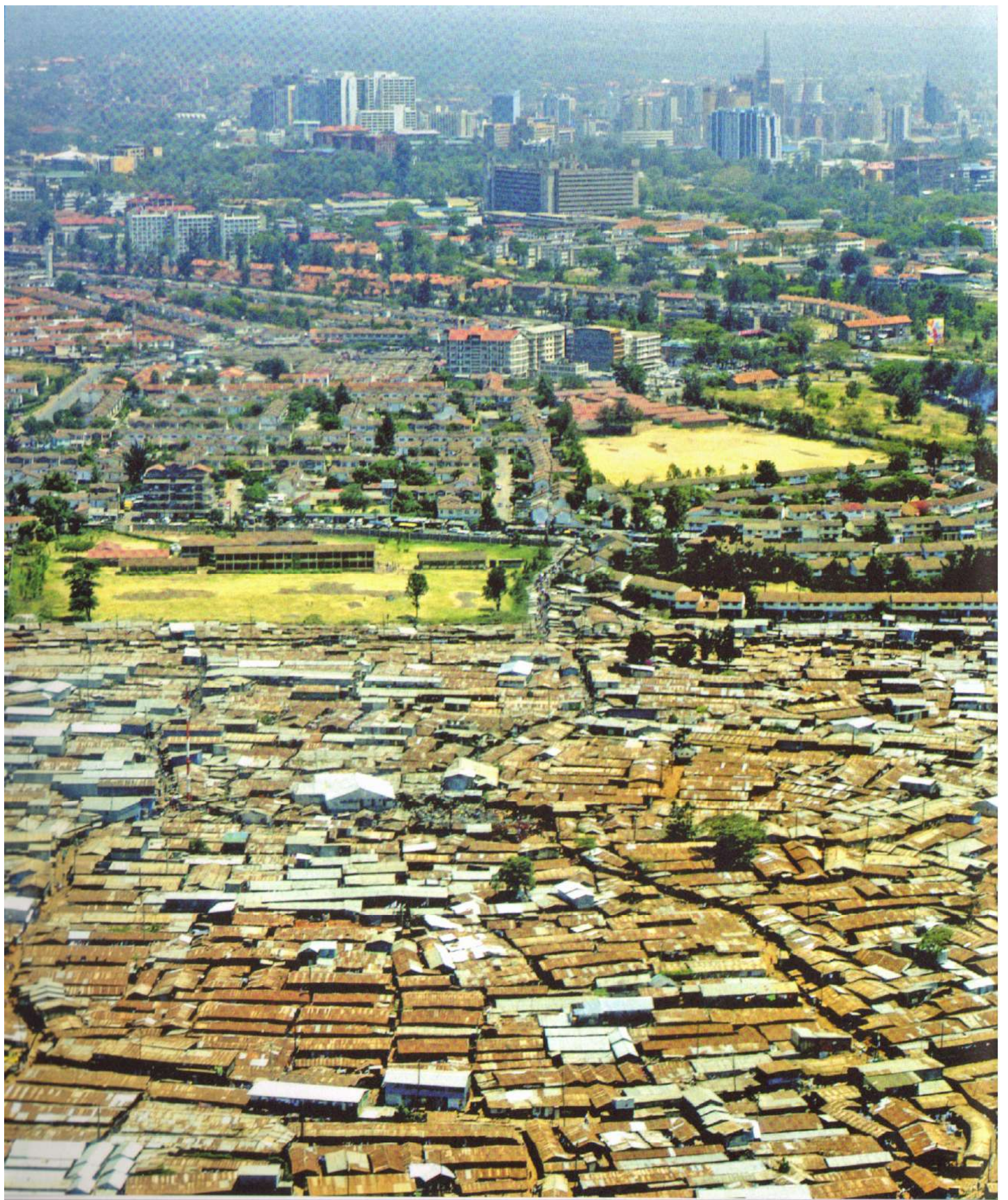
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The Landscapes of Eco-poverty

A view of Nairobi from the aircraft.
(Photo: L. Vallerini)

Lorenzo Nofroni

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In some recent publications the economist Edward B. Barbier has highlighted how, following the trajectory of the global processes in action, a perspective for the immediate future in which the whole of humanity, and not just one part of it, will be forced to face pressing choices conditioned by a new economic, social and cultural situation, that of the scarcity of environmental resources, is increasingly probable, a new epochal condition that the author has called the 'age of ecological scarcity'.

Compared to other times in the history of mankind, in the era of ecological scarcity economic growth, and with it also the improvement in the conditions of the poorer sectors of society, will not happen through the expansion of the boundaries of the exploitation of resources, since these limits have already been surpassed and a new era of coexistence with the phenomenon of the depletion of resources is underway.

During the past 50 years, ecosystems were modified faster and more extensively than in any previous period in human history, mostly in order to satisfy the growing demand for food, drinking water, wood, fibres and fuel. The result was a considerable drop in the economic benefits provided by ecosystems. According to the *Millennium Ecosystem Assessment*, approximately 60% of the main global ecosystem services were degraded or used in a non-sustainable way².

Poorer populations will be those to be hit harder by the continuous loss of these ecological services, in fact all over the world the poorer sectors of society live in ecologically fragile areas, often already subjected to various forms of environmental degradation, generated mostly by the richer and more powerful sectors of society³.

Over 600 million people throughout the world live in rural areas, mountainous regions, forest systems and arid lands which are subjected to the degradation of the soil and water stress⁴.

These populations survive with less than 1 US Dollar per day in conditions of extreme scarcity of resources, a scarcity which in time has

been correlated to the atavistic condition of economic poverty, generating more incisive and deep forms of humanitarian crisis. These areas are also considered the most vulnerable to climatic and ecological disturbances, factors which foretell increasingly worsened scenarios.

The link between ecological scarcity and poverty

The link between ecological scarcity and poverty is an issue which has caught the attention of both academics and scientists, producing a series of studies and consolidated theoretical foundations. However, the appearance of the neologism, eco-poverty, or ecological poverty, a term expressing a key concept for addressing the issue from new perspectives, is in fact quite new.

The term eco-poverty introduces a new interpretative model which attempts to modify the exclusively economic meaning of the term poverty⁵. This terminological revision is made possible because of the phenomenon of the scarcity of resources obtained from ecosystems, which involves human populations not only in economic terms, but also ecological ones. Eco-poverty is thus presented as a more brutal and primitive form of deprivation, linked to the scarcity of environmental resources and caused by the difficulty of access to natural resources to produce environmental services essential for the sustenance of a population⁶. It manifests as the lack of basic natural resources necessary for the survival and development of human society⁷. Thus a population that lives in conditions of eco-poverty is influenced only marginally by variations in income measured in monetary terms, whereas it is extremely conditioned by the slightest variation in the conditions of the ecosystems in which it lives⁸.

From this we can assume that a high value of ecological poverty determines any other form of deprivation and marginalisation, threatening any possibility of improving social and economic conditions of those who experience it.

Analysing the landscape for understanding the origins of eco-poverty

Real-life conditions in many regions show how the phenomenon of eco-poverty is a part of a complex system of interactions between social and environmental processes of an often destructive and harmful nature for the system itself. If the phenomena of eco-poverty are present in an area where the scarcity of environmental resources and economic poverty are combined, there must be a set of conditions which correlate phenomena of environmental systems degradation to those concerning social exclusion, usually considered as causes of scarcity and poverty.

The state of the landscape represents a strategic tool for enquiring in a single synthetic task, into the complex interactions between man and the environment.

Therefore, recursive relationship between scarcity of environmental resources and poverty defines the phenomenon called landscape of eco-poverty⁹, this is, in other words, a condition resulting from the interaction between environmental degradation¹⁰ and deprivation processes¹¹.

Using the concept of landscape of eco-poverty, it is possible to consider that the scarcity of environmental resources, derived from the processes of degradation of ecosystems, and poverty, with its wider implications due to social exclusion, are both components of a single interaction system.

If we consider the link between a society and its environment, we can identify and interpret the formal and process-related consequences of the said relationship in systemic terms, that is as social eco-social system (ESS)¹².

The landscape, as product and consequence of the interactions between a society and its environment, stands as an important indicator of the state of equilibrium of SES. This feature derives from the fact that every action, every process and every way through which a system develops, has implications on landscape. Also pressure factors affecting the various components of the system – among which the phenomena of environmental degradation and social marginalisation –, can be recognised and inquired upon through the respective implications on landscape, in other words through landscapes of eco-poverty.

The degenerative spiral involving environmental decay and social exclusion: the case of Syria

We can particularly clearly identify today with a special degree of clarity some cases in which the presence of eco-poverty phenomena have direct implications on the state of the equilibrium of the social ecological systems and which may be interpreted therefore through the landscapes that they have generated. For example, the series of environmental and social phenomena that characterised in the recent history of the north-east of Syria, during the period that preceded the 2011 civil war of, offers numerous elements for reflection.

The three governorates of Raqqa, Deir el-Zor and Hassakeh form the region which was called the 'breadbasket' of Syria, territories historically linked to the production of wheat and the extraction of oil. Despite the strategic and economic importance of the region, it was home to the poorest section of the Syrian population¹³.

This area was affected by a series of interrelated phenomena which originated a degenerative 'short-circuit' at both the environmental and social levels, a spiral in which the scarcity of resources, the environmental degradation, the social disarticulation and iniquity certainly played a role in the determination of the crisis that led to the revolt against the regime. This degenerative condition emerged clearly during the droughts of 1988-93 and of 1998-2000. The Syrian government had always responded to the states of emergency with short-term strategies aimed mostly to controlling and if necessary repressing social revolts, therefore offering inadequate answers to the complexity of the phenomena and to the growing vulnerability of the region. The last drought that affected Syria during the period between 2005 and 2010, determined an impact which reached catastrophic dimensions with great human, economic, and environmental costs.

In fact, according to the Global Assessment Report on Disaster Risk Reduction (GAR 2013), during the five years of drought (2005-10), almost 75% of the Syrian agricultural production and approximately 86% of the livestock was lost. In particular, during the Winter of 2007-08, the average rainfall in all of Syria suffered a reduction of 66%, while in the north-east region of the country the phenomenon reached conditions never recorded before, with a total of 55 consecutive days without precipitation. In the governorates of Hassakeh, Deir ez-Zor and Raqqa, the effects of the long drought on the harvests of grain and other agricultural products was disastrous¹⁴.

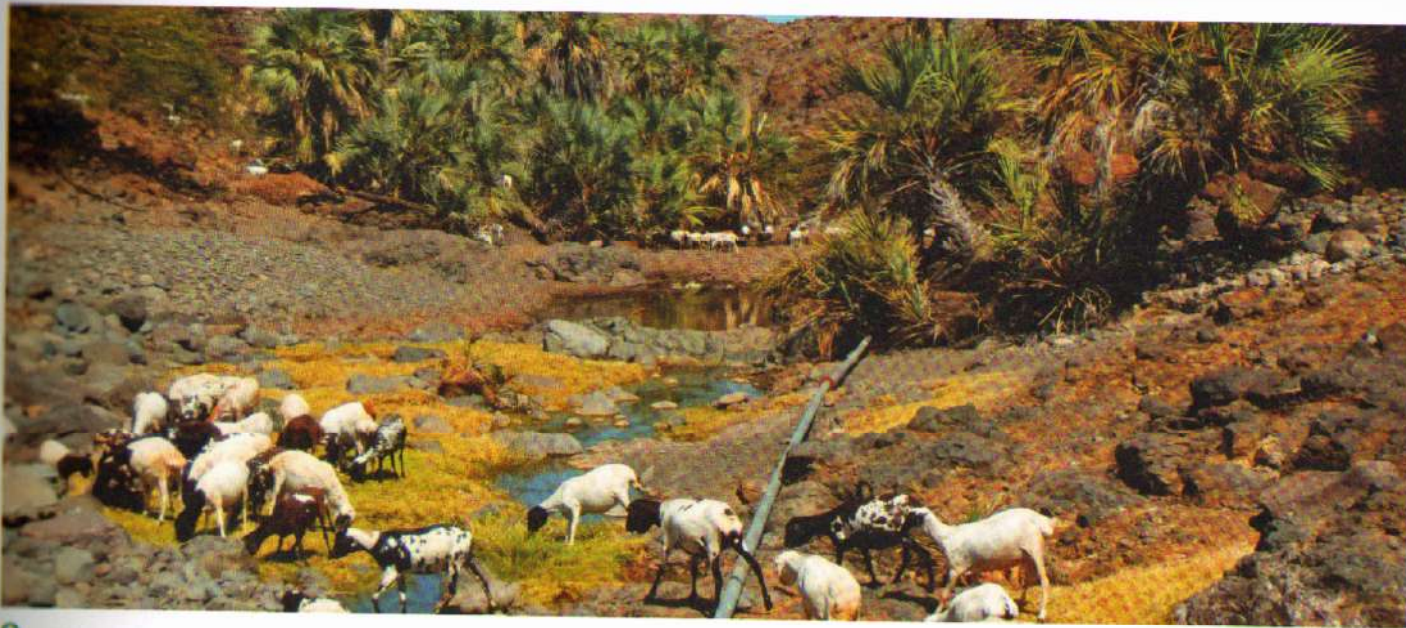


Fig. 1 The springs of the Ngobole Oasis or Oasis of the Moon: the increasing settlement pressure and the unregulated use of the springs, have rapidly reduced the available water resources. (Photo: L. Vallerini).

This calamity occurred during a serious political and economical crisis aggravated by the increase in the Syrian debt, the global financial crisis and the increase of food prices worldwide (especially grain). This forced the government to cut subsidies and raise the prices of fuel and fertilizers¹⁵. The condition began to worsen in 2010, when Syria had to import grain and other food products for the first time in 15 years. In the north-eastern region the convergence of economic crisis and environmental catastrophe led to the collapse of the production system, forcing approximately 50,000 families to abandon their lands¹⁶.

The first revolts of 2011 in Raqqa and other cities of the north, which eventually turned into civil war, thus arrived at the end of a long process of weakening of social and environmental balances. As De Châtel¹⁷ has noted, although the drought had effects on all the countries of the Middle East, the most catastrophic effects were registered in Syria, which may confirm the hypothesis of a strong relationship between the failure of the economic development model, the inefficiency of the actions undertaken by the government, the increase in the vulnerability to climate change, the greater impact of the calamity, and social and environmental fragility.

The Arab revolutions in the Middle East and in North Africa highlight issues that previously had not been entirely explored. The scarcity of resources and the environmental and social security emerged as relevant issues, together with the usual interpretative models concerning global geo-politics and economics. It is therefore necessary to undertake research which focuses on the various social and envi-

ronmental phenomena that can trigger degenerative conditions for populations and eco-systems leading to environmental and humanitarian crises which could sometimes be avoided.

The system of interactions and feedback: an interpretative model for landscapes of eco-poverty

From the scientific literature and through the observation of case studies, such as that of Syria, it is possible to suggest some hypotheses on the complex and interconnected nature of the phenomena that stem from the interaction between environmental decay and social exclusion and generate the landscapes of eco-poverty.

As previously stated, using the SES model it is possible to 'break-up' the image of a landscape according to its social and environmental components¹⁸.

The condition of equilibrium of an SES depends on the balance between factors that determine creative interactions (as in organisational forces opposite to the disarticulation of the system) and factors that determine perturbative interactions or pressures (variations that can modify the evolution of the system itself, generating a greater fragility and a higher level of entropy). We can identify a condition of crisis of the system in which the landscapes of eco-poverty manifest, when the effects produced by the factors putting pressure on the system surpass the effects of the elements that play a contrasting or balancing role.

Based upon the same reasoning through which it is possible to subdivide an SES into systems and subsystems, it is also possible to de-



Fig. 2 Crop land in the Nairobi plateau: one of the areas with the highest density of crops in Kenya and numerous problems related to the intensive exploitation of environmental resources. (Photo: L. Vallerini).

structure the pressure factors linked to environmental decay and social exclusion and identify the articulation of their interactions. It is thus possible to identify four groups of pressure factors:

- pressure generated by markets and economic processes combined with the absence or failure of governmental policies (PF1);
- demographic pressures combined with levels of consumption (or dependency from resources) and the technological level available (PF2);
- pressure generated by the reduction of the availability and the capacity of regeneration of resources (PF3);
- pressure generated by environmental calamities combined with the level of sensitivity and exposure of the system (PF4).

Pressure factors can effect not only the system to which they belong but also other subsystems, generating related phenomena with negative effects that have an effect on the entire SES. This creates the need to identify the interaction and feedback processes, that is the system of interactions that intervene as a result of the combination of various pressure factors.

The system of interactions was constructed on the main correlations underlined in the observation of specific case studies and with the results of the scientific research on the subject. The system is organised following six interaction processes¹⁹.

The synoptic chart below presents a schematic synthesis of the matrix of interactions between pressure factors without, however, a

hierarchy among combined factors, since in real life the interaction processes do not follow a direct causality, but rather a circular and recursive logic²⁰.

We refer to positive feedback regarding social fragility (R1) and positive feedback regarding environmental fragility (R6) in those cases in which conditions of social exclusion and environmental decay appear, produced mostly as a consequence of pressure coming from within the social or environmental components of a system²¹. These conditions occurred quite evidently both in the Syrian case and in other eco-social systems in the Middle East and in North Africa, such as Libya, Egypt²² and Tunisia²³.

Interaction R2 can be defined as "iniquity in the access and use of resources". It is determined by the correlation of pressure factors that act on the government subsystem and on the subsystem of the production of resources, thus the absence or failure of policy, correlated to a condition of pressure that effects the capacity of the system to regenerate resources, can lead to an increase in the effects, not concerning the scarcity of resources, but also on the inevitable increase in social iniquity²⁴.

In the Syrian case this interaction is highlighted by the failure of the agricultural development policies imposed by the regime since coming to power. The model of development based on the intensive exploitation of environmental resources caused the impoverishment of the system of reproduction of resources, in particular regarding the use of groundwater and the preservation of the fertility of the

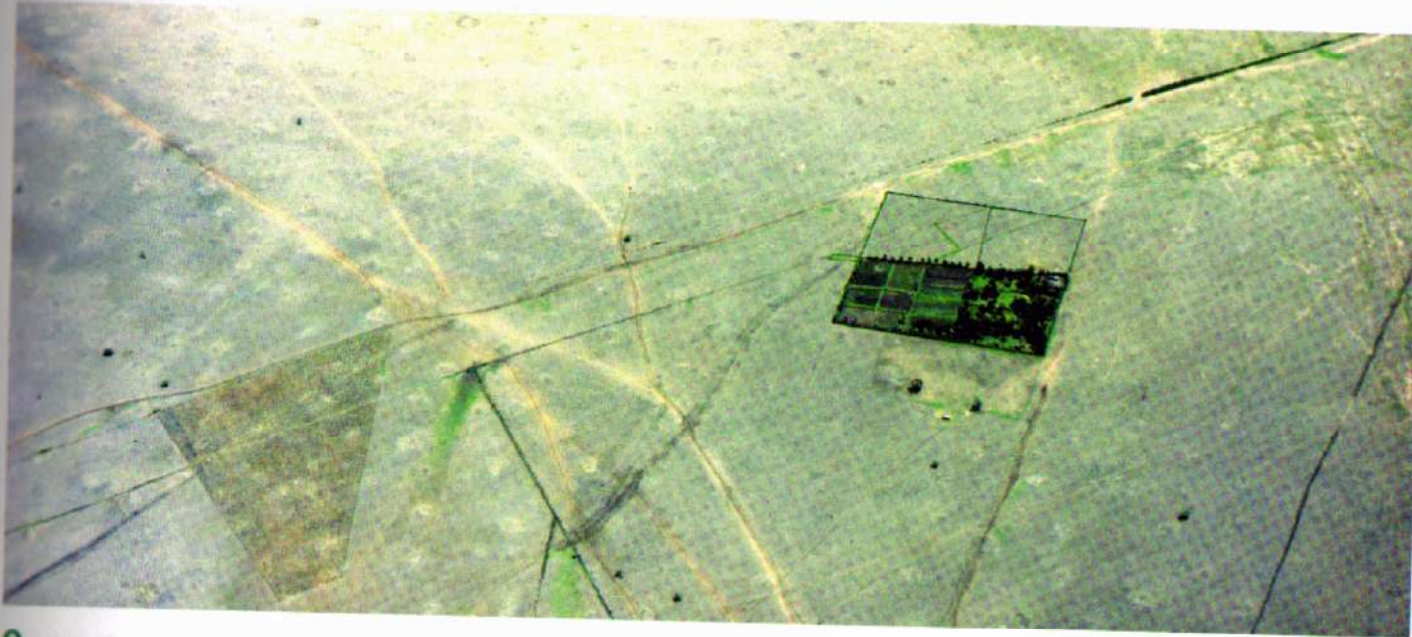


Fig. 3 Cultivated area in the arid zones of northern Kenya: the traditional and prudent use of environmental resources allows to develop a domestic economy sufficient to support the members of the settled community. (Photo: L. Vallerini).

soil. This policy determined the progressive increase in water consumption and in the degradation of the soil, exacerbating social conflicts due to the access and usage of resources in a social system in which corruption, lawlessness and abuse of power favoured both iniquity and discrimination.

The R2 interaction process is often linked to R3, that is the "impoverishment of environmental control and regulation systems"²⁵. This interaction can be identified in all cases in which the reduction of collective and individual investments made to maintain the regulation and control of a territory make the system more exposed to exceptional climatic events, thus multiplying the risk of disasters and the impact of the phenomena. In the north-eastern region of Syria, the lack of investment of resources into long-term systems of control and regulation amplified the effects of the prolonged drought of 2005²⁶.

Interaction R4, "ecological-distributive conflicts and environmental segregation"²⁷, expresses the correlation between pressure from the cultural system and pressure from the factors of reproduction of resources. In this case, the destabilising feedback may derive from demographic pressure or from the levels of consumption of the population and induce effects on the availability of environmental resources. The Syrian case once more points clearly and evidently to the degenerative interaction between anthropic pressure and available resources.

In fact the deep environmental degradation, the incisiveness of the

drought and the scarcity of hydric resources, as a consequence of the vulnerability of the system, and of the lack of tools for adaptability, determined enormous economic losses – especially for the weaker sectors of society which depended on agricultural production to support a domestic subsistence economy depending on state subsidies – and the consequent low prices of fuel and fertilizers. This series of events highlighted the presence of phenomena of environmental segregation affecting especially small communities of peasants, increasing distributive ecological conflicts on the appropriation of residual resources and the use of water reserves from tanks, barrages or dams.

Without the necessary provisions for a long-term solution of the problem, these areas of segregation and conflict were subjected to additional pressure linked to migration and the abandonment of the land, a phenomenon which often has negative effects, increasing the process of degradation of the soil, the loss of fertility and the increase in desertification, resulting in an "increase of the risk of calamity" (R5). This is the last of the processes identified, describing the interaction between factors of pressure from the subsystem of culture and the pressure from the subsystem of environmental control and regulation. In this type of interaction the change in climatic conditions or the reduction of the system of regulation of an ecosystem can intervene within a system that presents critical conditions regarding, for example, demographic and migration phenomena.

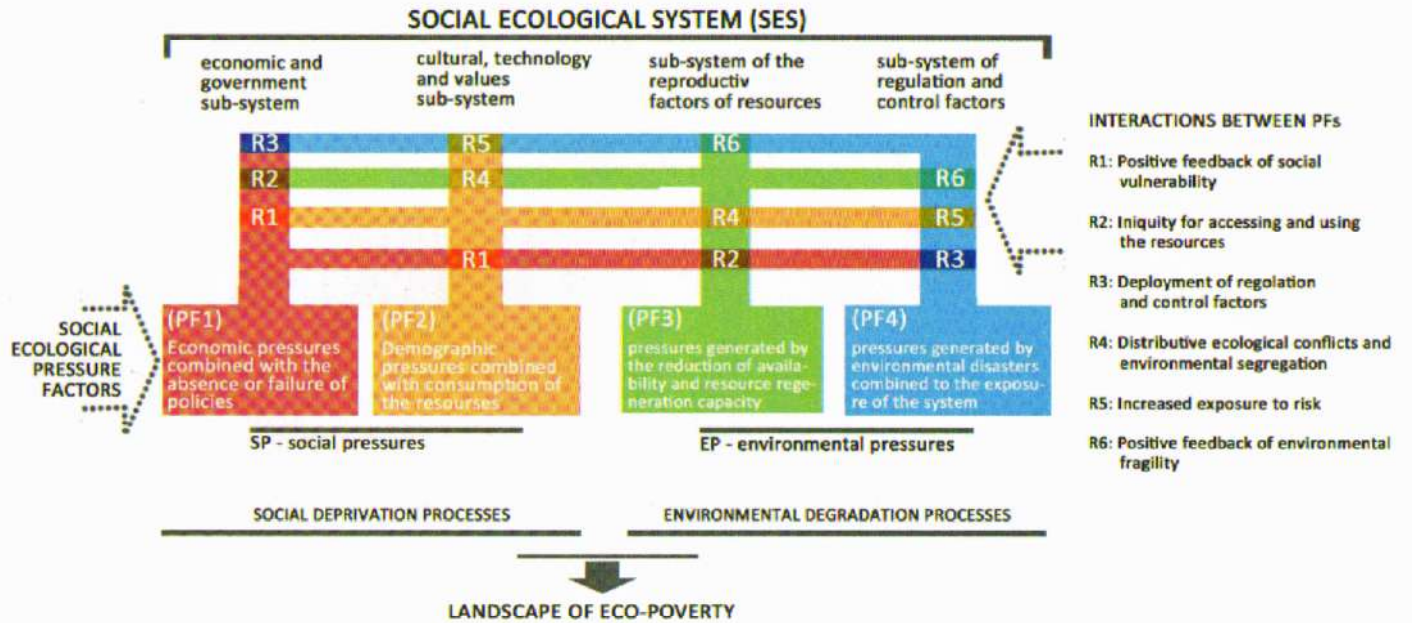




Fig. 4 The logical framework of interactions between phenomena of social deprivation and environmental degradation. (L. Nofroni).

Fig. 5 Areas along the north part of Lake Turkana: this area has turned from a fertile plateau to arid area, anthropic action has undoubtedly been one of the most important components of the desertification process. (Photo: L. Vallerini).

The use of landscape planning as a strategic instrument for overcoming Eco-Poverty

As may be deduced from the logical frameworks and the Syrian case, the set of social and environmental pressure factors and of the relative interaction processes may contribute to a territorial condition in which environmental degradation and social exclusion emerge as predominant processes. As previously stated, the inquiry into the landscape is not only useful for determining critical factors, but may also indicate, through landscape planning, choices and systemic transformations that may contribute to achieving objectives of both an environmental and social nature.

Through the concept of the landscape of eco-poverty, it is possible to inquire into critical social and environmental phenomena in specific regional contexts using a new interpretative model.

The project for a landscape which is a consequence of all that has been said above will face a wide range of problems and situations; it may be combined with different types of interventions depending on the area of action: political, economic, cultural, environmental; it may adopt commensurate intervention scales, case by case, as appropriate to each problem; and will develop strategies that will be configured not only through direct actions on the territory and the forms of the landscape, but also through the establishment of cultural or economic processes that involve the communities in question.

Thus a project for a landscape that sets as its main objective the resolution of the problems generated by phenomena of eco-poverty must address subjects and solutions characterised by a hybrid nature which is also subdivided into social and environmental issues. The planning strategy proposed in this volume is part of a trend to search for new and more efficient approaches in order find answers and solutions to the phenomenon of the landscapes of eco-poverty. It proposes a planning approach that is also a hybrid between environmental and social concerns, a new category which may be labeled as 'eco-social'.

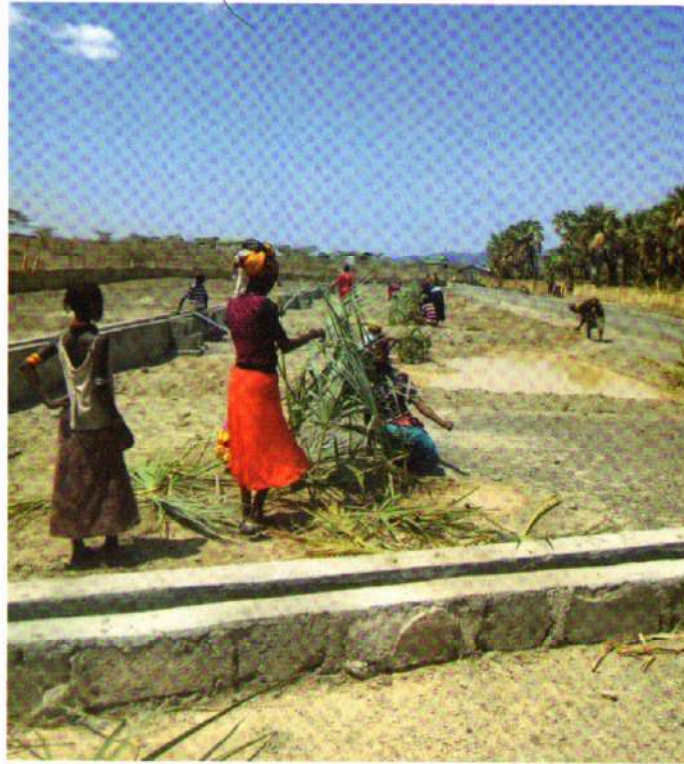


Fig. 10 Plant cultivation in the new nursery following the first developments of the Oasis Ecosystem project. (Photo: J. Nakhulo).

Fig. 11 Work on the construction of the new water system from the palmeria following the first developments of the Oasis Ecosystem project. (Photo: J. Nakhulo).

Endnotes

¹ Barbier, E. B. 2011, *Scarcity and Frontiers. How Economies Have Developed Through Natural Resource Exploitation*, Cambridge University Press, New York.

² Millennium Ecosystem Assessment, 2005, *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, DC.

³ Kates, R.W., Haarmann, V. 1992, *Where the Poor Live: Are the Assumptions Correct?*, «Environment», Vol. 34, n. 4, pp. 4-11; 25-28.

⁴ Barbier E. B. 2011, op. cit.

⁵ This meaning obviously derives from a theoretical stance according to which economic development has a set of established rules that consider the environment and its resources as natural assets whose exploitation is theoretically possible until the depletion of the said assets, thus not considering the effects induced on the earths' ecosystem, while poverty, being a manifestation of the economic level of individuals, can be resolved within the economic system itself.

⁶ Coward E. W., Oliver M., Conroy M. 1999, *Building Natural Assets - Rethinking the Centers' Natural Resources Agenda and Its Links to Poverty Alleviation*, proceedings «Meeting on ASESSing the Impact of Agricultural Research on Poverty Alleviation».

⁷ Agudelo C., Rivera B., Tapasco J., Estrada R., 2003, *Designing policies to reduce rural poverty and environmental degradation in a hillside zone of the Colombian Andes*, «World Development», Vol. 31, n. 11, pp. 1921-1931.

⁸ Agarwal A., Narain S. 2000, *Redressing Ecological Poverty Through Participatory Democracy: Case Studies from India*, Political economy research institute - working paper, University of Massachusetts Amherst.

⁹ Nofroni L. 2017, *Paesaggi delle eco-poverty nel Mediterraneo. Il paesaggio come strumento di osservazione e di proiezione strategica per il superamento delle iniquità eco-sociali*. Tesi di Dottorato in Progettazione e Gestione del Paesaggio e dell'Ambiente Università di Roma La Sapienza, not published.

¹⁰ By 'environmental deterioration' is understood the excess of consumption of biotic and abiotic resources in relation to the capacity the environment has to produce them.

¹¹ Defined as a process placed along the integration/exclusion axis (Ranci, 1996), it concerns that section of society which, although part of a community is alienated and discriminated upon, excluded both from decision-making processes and from the use of resources, as well as from those guarantees offered to most individuals or groups belonging to the system (Gallino, 1993), and is based on political, cultural, economic or environmental conditions.

¹² There are many theories concerning social ecological systems. It is worth mentioning the definition established by Redman, Grove, and Kuby, for whom a social ecological system is a coherent system of bio-physical and social factors that interact regularly throughout time; a system that is defined at various spatial, temporal and organisational scales, and which can be structured hierarchically; a system that possesses a set of critical resources (natural, socio-economic and cultural), whose range and use is regulated by a combination of ecological and social factors; a complex and dynamic system in perpetual flux and adaptation. (Redman, Grove, Kuby, 2004)

¹³ Most of the active population works in the agricultural sector and has a income that is slightly above 100 US Dollars per month.

¹⁴ Regarding harvests of the previous year, the average production dropped by 32% in the irrigated areas and up to 79% in non-irrigated areas; the losses in the harvests of wheat and barley were somewhere between 47 and 67%; the harvest of wheat produced approximately 2.1 million tonnes (the national food requirements are calculated for that same period at approximately 3.8 million tonnes), thus registering a reduction of almost half of the average long-term production which was equal to 4.7 million tonnes.

¹⁵ The behaviour of the regime in this situation has been widely studied, and it has been highlighted how the economic strategies of the regime may be explained as an attempt to open the Syrian economic system to the world market through a progressive transition from a planned economy to a social market economy, a failed attempt both in terms of means and of manners: the measures of deregulation imposed since 1986 have caused the gradual elimination of some subsidies and other forms of support for agricultural enterprises. The cut in subsidies, linked to the need to reduce the deficit in public finances, was not accompanied by the necessary social welfare measures, and therefore the lack of social security cushions made the cuts to subsidies unsustainable and accelerated the process-ESS which favoured social fragility.

¹⁶ Worth R. F. 2010, *Earth Is Parched Where Syrian Farms Thrived*, «New York Times», October, 13rd.

¹⁷ De Châtel F. 2014, *The role of drought and climate change in the Syrian uprising: Untangling the triggers of the revolution*, «Middle Eastern Studies», v. 50, n. 4, pp. 521-535.

¹⁸ The two components can in turn be de-composed into subsystems characterised according to the functions they perform within the system. Four subsystems can be identified, two related to the social component: an economic and government subsystem, and a cultural, technological and values subsystem; and two related to the environmental component: a subsystem related to the factors of reproduction of resources, and a subsystem regarding the control and regulation of the environment.

¹⁹ The system of interaction between pressure factors is organised according to a four by three matrix. In particular, each pressure factor interacts with the others through three interaction processes, due to which it is possible to have twelve correlations (four pressure factors by three interactions). Since the interactions are one-to-one and symmetrical, the process of interaction between the pressure factor PF1 and the pressure factor PF2 corresponds to the process of interaction between PF2 and PF1, and the same applies to the other cases of interaction.

²⁰ For this reason in the synoptic chart the numbered acronyms are instrumental to its interpretation but do not determine an order or degree of prevalence.

²¹ For example, a positive feedback that increases social fragility may be generated by the failure of governmental policies or by the intervention of negative economic choices, whose impact is increased by the interaction with critical social conditions derived, for example, from demographic pressure or the levels of consumption in the population. Thus a positive feedback that increases environmental fragility can be generated by a climatic condition that challenges the control and regulation system and puts pressure on the factors related to the reproduction of resources.

²² Werrell C. E., Femia F. (2013), *The Arab Spring and climate change: a climate and security correlations series*, The Center for American Progress, Stimson, and The Center for Climate and Security.

²³ Radhouane L. (2013), *Climate change impacts on North African countries and on some Tunisian economic sectors*, «Journal of Agriculture and Environment for International Development», no.107, pp. 101-113.

²⁴ This will result in landscapes that are strongly connotated by a social organisation in which various groups fight for the resources, with areas of the territory in which resources will always be less available and where the poorest sectors of society will be located. In these cases the term environmental justice is used, that is a form of discrimination or social exclusion in which a critical environmental condition - scarcity of resources, pollution, reduction of rights over common assets - underlies and is the direct cause of social criticalities.

²⁵ This process expresses the interaction between the pressure factors linked to the subsystem of government and to those linked to the subsystem of control and regulation of the environment.

²⁶ The general disregard from the Syrian regime when the first signs of collapse of the system appeared, in addition to the refusal to use international and national funds and investments for solving the problems related to drought, surely played a relevant role in increasing the damages caused by the drought.

²⁷ With the term distributive ecological conflict, Martinez Alier indicates the process of social dispute which originates in environmental conflicts of interest concerning the distribution and use of resources and the distribution of the negative effects on the environment of human activities (Martinez Alier, 2014)