

## Biodiversity, Environmental Education and Social Media

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**ABSTRACT** The synergies between environmental education, technological innovations and social media are considered and reviewed. The possibility to use these synergies to create sustainable behaviors on a large scale is discussed.

**KEY WORDS** Environmental communication; technological innovations; collective intelligence, emergent behavior.

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### INTRODUCTION

Ecosystems, with their contents in biodiversity, are the platform on which our entire existence is based (Costanza et al., 1997). The whole of Earth's ecosystems provides essential services to humanity as a whole estimated at over U.S. \$ 72 trillion a year comparable to the entire world's gross income. Nevertheless, in 2010 almost two thirds of the planet's ecosystems have been considered degraded due to damage, mismanagement and lack of investment in their productivity, health and sustainability [Nellemann & Corcoran (eds.), 2010]. At the same time, the number of endangered species increases year by year (Fig. 1) and, according to the Global Environment Outlook (UNEP, 2007), our planet is experiencing its sixth mass extinction mainly caused by the man. Already in 2004 the risk of extinction of terrestrial animal and plant species caused by human effects on climate was estimated between 15% and 37% (Thomas, 2004). The loss of biodiversity has also major impact on food production. For example, many of the world's major crops such as coffee, tea and mango are highly dependent on entomophilous pollination and pest control performed by birds and insects. The degradation of ecosystems and the consequent loss of biodiversity could lead, by 2050, to a reduction of up to 25% of food production, increasing the risk of starvation for

many people [Nellemann & Corcoran (eds.), 2010].

In the light of these perspectives, in the next decades it is imperative to move from a society based on the growth of material consumption to one based on the sustainability, avoiding the degradation of natural systems and their inhabitants. This transition will be possible only with a heavy impact on the mentality and the habits of billions of people and, in this context, environmental education and environmental communication become basic. It is quite obvious why these processes are undergoing a strong acceleration both globally and at the level of individual nations. It is no coincidence that, in Italy, the strategic plan for biodiversity (AA.VV., 2010) identifies, as one of the major goals, the increasing, in the population, of the awareness of the importance of biodiversity and its conservation; this objective is to be followed through the policies based on environmental education supported by the modern computer technology and the multimedia (AA.VV., 2010). Environmental education and, in general, environmental communication are a means of creating the significant changes in everyone's behavior, essential for creating a new sustainable culture. In this sense, the learning and the acquisition of a collective behavior become the basic means to achieve the sustainable patterns of behavior and development. The set of actions and attitudes by

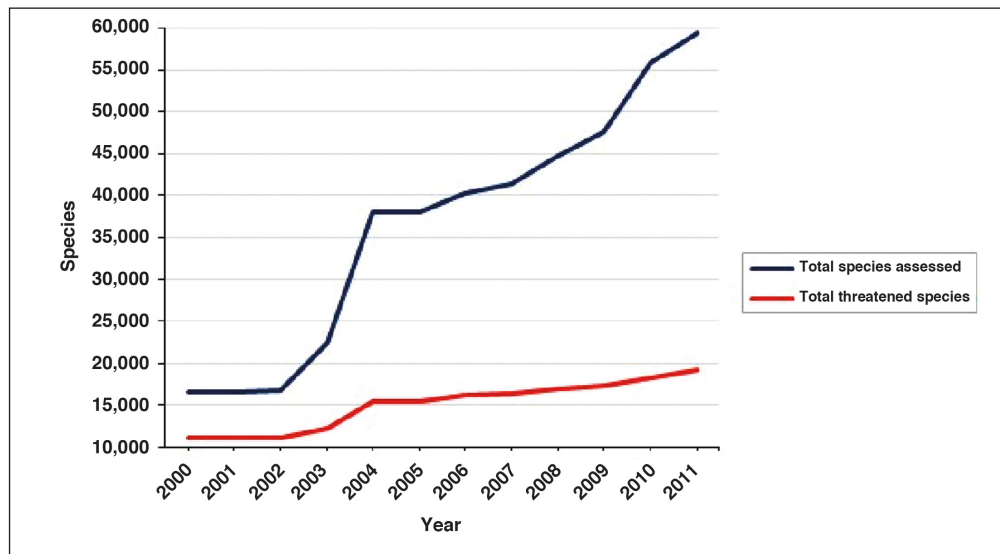


Figure 1. Increase in the number of species assessed for The IUCN Red List of Threatened Species™ (2000–2011.1).

which the individual expresses his personality and relates himself to the others and to the environment are the result of multisensory personal processes and are dependent on continuous interaction and feedback. As such, they are deeply involved in the evolution and the technological innovations increasingly used in education and environmental communication. Currently, the most innovative and fastest way to change the behavior at global level seems to be the use of the social media (Kaplan & Haenlein, 2010), which are represented by different ways of web

communication which range from networking sites to virtual worlds (Table 1). The most interesting features of the social media are the velocity of circulation and of diffusion of the informations, the vast pool of users and the pervasive force in creating new trends and behaviors. For this reason they are already widely used in online marketing. The social media, together with the planetary network of computers, smartphones and personal tablets, offer a great opportunity and represent the most promising choice for the spread of a new sustainable culture.

		Social presence / Media richness		
		Low	Medium	High
Self-presentation/ Self-disclosure	High	Blogs	Social networking sites (e.g., Facebook)	Virtual social worlds (e.g., Second Life)
	Low	Collaborative projects (e.g., Wikipedia)	Content communities (e.g., YouTube)	Virtual game worlds (e.g., World of Warcraft)

Table 1. Classification of Social Media by social presence/media richness and self-presentation/self-disclosure (from Kaplan & Haenlein, 2010).

## DISCUSSION

Various definitions of the environmental education have been given, one of the most comprehensive is that developed during the conference organized by UNESCO in October 1977 in Tbilisi.

In that document (UNESCO, 1978) it is reported (recommendation no. 1, point 3): “*A basic aim of environmental education is to succeed in making individuals and communities understand the complex nature of the natural and the built environments resulting from the interaction of*

*their biological, physical, social, economic and cultural aspects, and acquire the knowledge, values, attitudes, and practical skills to participate in a responsible and effective way in anticipating and solving environmental problems, and the management of the quality of the environment”.*

The first part of the definition regards the descriptive and the notional aspects of environmental education which are acquired through the learning of schematic transverses across different scientific and environmental disciplines.

This notional approach, such as “know the world around you,” was applied, with some exceptions, in many schools since the eighties and nineties of the last century. More important, however, are the goals and the values of environmental education that should lead to a change in knowledge and behavior. The ultimate purpose, which means a key step, is the passage from the particular to the global, namely the verification of transformation of all projects of environmental education and communication in a real change of each one’s behavior, the sum of which becomes global awareness. The transition from individual behavior to global awareness requires a network of relationships and knowledge, and all this strongly affects the use of computer technology and multimedia. Although this approach could have a significant fallout only on part of the most industrialized world, it is sufficient to reach a critical mass so that environmental communication could have positive effects. This objective, however, is always very difficult to be fully achieved and verified, especially due to the strong competition of the conflictual ethics and for the complexity of checking the behavior acquired out of the learning paths.

To achieve better results, greater importance should be given even to the type of emotion and to the strong empathy which should be established in the active involvement of consciences, especially those of the young. For this reason, the implementation of any environmental education project should be seen as a continuous and broad-spectrum process which reaches the final result of the establishment of a new emotional bond with the natural and anthropic world that surrounds anybody. In any case, reaching the awareness of the risks of a development without limits to growth, with its inevitable political and social implications, and the understanding that the only

possible development is the sustainable one, are cultural paths neither easy to acquire and not easy to verify. In summary, the objective to be pursued is to stimulate the profound cultural transformations which lead to the formation of a new conscience in which the awareness and the dignity of being citizens of the “Gaia planet” give priority to values that are currently very far from the collective perception.

The long path towards these aims is even more complicated for the exponential acceleration of the planetary emergencies. The prediction of a relatively rapid breakdown of traditional energy resources and the approaching of the point of no return for global warming, greatly reduce the chances of success of traditional educational systems, which are based on a continuous, but slow, process of the cultural evolution, which should lead the children to become good citizens in the future.

Accelerating behavioral changes and the maturation of awareness using faster and more persuasive ways of environmental communication becomes a priority. In this context, the modern information technologies and the social media (including social network, content communities, blogs, the hundreds of thousands apps used in mobile devices, etc.) seem to offer many answers and opportunities. Personal experiences and direct learning are, however, an essential step of understanding and knowledge of both natural and anthropic environments. Visiting an industrial complex or a natural park, walking along a river or spending a day in a farm, are not replaceable approaches; they involve a personal commitment involving all the senses and activating feedbacks and positive behaviors.

At this point, it is important to wonder about how modern technology affects learning and perception, and if the use of technology in environmental communication may provide a genuine and undistorted experience. Simply put, the question is whether these means are to be considered as facilitators and amplifiers of learning, or instead, they are just trendy gadgets of no use in environmental education. Of course, this problem is much debated and has several facets, which, schematically, can be traced to two antithetical attitudes. The first, more extreme, does not require the use of any technical device and is based on a direct relationship between the envi-

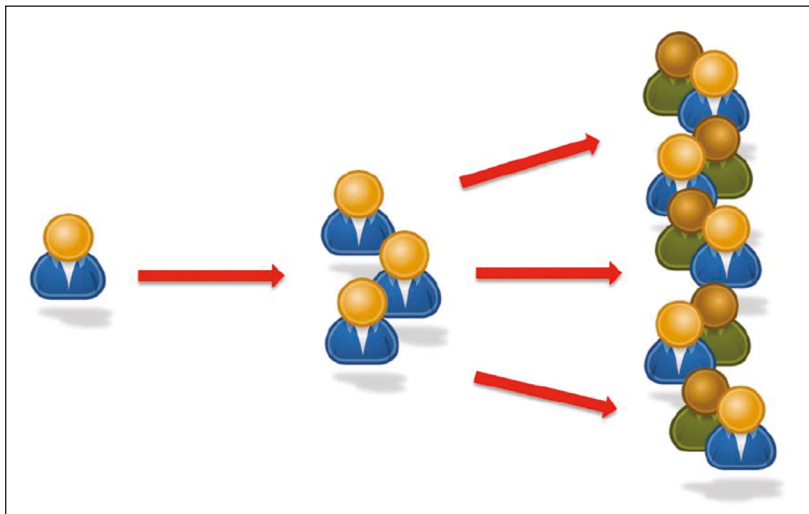


Figure 2. Outline of rapid multiplication flow of information between the nodes.

ronment and the man, a sort of return to the myth of the noble savage. This view, though valuable in its simplicity, however, seems anachronistic and unfortunately late now. The second, opposite, considers as essential the personal terminals for proper learning aids. The trend seems to favor the latter hypothesis, as evidenced, for example, by the increasing amount of the number of users of smartphones, 15 million users only in Italy in 2010 (comScore, 2010). In contrast to the debate, the degree of impairment of the environmental balance is much clearer and can be easily illustrated using a dialogue of the film by Yann Arthus-Bertrand HOME (at <http://www.youtube.com/watch?v=jqxENMKaeCU>): *"The cost of our actions on the environment was very high but it is too late to be pessimistic"*. This attitude, highly realistic and not hypocritical, is based on, and emphasizes, one of the most important human qualities: adaptation, making us see the change as an achievable goal, even if difficult. For this reason, the use in environmental education of the network of computers, smartphones and personal tablets connected to the social media becomes fundamental to pilot the actions and the behaviors, even if apparently uneven and unrelated, to the desired effect.

In the connected world, the progress is "collective intelligence"; the development is no longer a linear and mechanical process, because our world has become, thanks to technology, a "cultural system" where open innovation is a virus that goes in any direction (Lévy, 1994). In this scenario, the power of collective intelligence is put in

evidence by the extension of personal technology, so that actions and behaviors of each individual, associated and cooperating, reach a new critical mass, determining the so-called "emergent behavior" (Beni & Wang, 1989; Kaiser et al., 2010), or rather, a systematic set of individual intelligences, whose actions and emotions work together to produce important and decisive effects at educational, sociological, political and anthropological levels (Graefe & Vogelsong, 2008).

At this point, the technological means becomes an integral part of each individual; it becomes, at the same time, a catalyst and an implementer of the individual actions and behaviors and builds the transition from the local to the global in a simple and complete manner. Assuming that the environmental knowledge is a precursor, or at least a correlate, to the environmental behavior change, the use of current and future information technologies, combined with the possibilities offered by social media, enhancing connectivity and synchronization of thought, could contribute significantly to the formation of a single common thought and impose quickly eco-sustainable behaviors. In this way, the individual perceives to be part of an unique social context, to which it is impossible not to belong, and he is forced to channel his behavior in that direction.

The new social media, which were born and have evolved through information technology, are well suited to be used as a means of a rapid dissemination of ideas, using the same mechanisms of the viral marketing in which an important idea can spread very quickly (Maibach,

1993; Wilson, 2000; Gordon, 2011). In this regard, it must be considered that, in a social network, the connections that bind the individuals ensure a rapid flow of information between the nodes (Fig. 2), allowing, relatively quickly, to make decisions and to update the individual behavior. In addition, the mechanisms which regulate and control a social system, despite their complexity, are simpler than those of a natural system, for this reason the assertion of a new global behavior implies the involvement of a critical mass estimated at around 20% of the nodes (Yang-Yu et al., 2011).

## CONCLUSION

A critical period, both in social and environmental terms, is approaching and the obligation to learn as quickly as possible the sustainable behavior will increase the importance of environmental education and its widespread dissemination. Certainly, the environmental changes induced by climate change and the biodiversity loss will not disappear overnight, but the sooner humanity shall become aware of the problem and intervene the better it will be able to control its own destiny and protect the beauty and the diversity of the planet for future generations.

The use of information technology now enables to expand awares and emotions, transforming the mode of construction of knowledges and training processes. Global connectivity, reached through social media, could enable to realize these new behaviors, which should realize a reversing of the actual trend: "*Destroy what is essential to create the superfluous*". For these reasons, environmental education, in synergy with social media, represents a strategic tool for the conservation of biodiversity at both global and local level.

Environmental education, more than other instruments and/or strategies, can certainly play a decisive role in changing consciences and behaviors, provided that it is pervasively conveyed on a variety of means of communication, allowing to reach a critical mass which could carry out the significant changes. From this point of view, information technology and communication, which are increasingly entering our daily life, while leading to a reduction of our liberties,

however, would enable to speed up the acquisition of new skills by creating a sustainable global response constituted by the individual local actions.

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