



From efficient cause to final cause: the role of geoethics in the frame of geosciences

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For centuries philosophy resided on the Aristotle's idea that events in nature occur as the result of four causes of which the efficient and final ones are the most important: the first being the agent and the latter the scope of any process, including the animal and human sphere. Modern science starting with the scientific revolution of Galileo and Newton progressively cancelled the concept of any finality in the world, which led to the success of full rationalism and later, in the epoch of positivism, to the cultural domination of the deterministic view. Rationalism is at the base of the today's structure of our scientific knowledge and has survived to the decline of positivism after the break into the scene of the randomness and quantitation as an essential part of the natural processes of atomic and subatomic scales and also after the supposed perfection of mathematical logic showed to lead to paradoxes and antinomies by the work of Russel and Gödel, for instance.

The so-called hard-sciences such as physics, astrophysics, geosciences, chemistry etc. are all intrinsically formed around the "efficient cause" concept: their main goal is to study the nature of the processes through experimental and theoretical methods, to identify and quantify the main governing factors and to model them by means of equation allowing predictions for the future. Social and biosciences, including psychology and neurosciences etc., have mainly developed following the same approach, treating biological systems (from single organisms to complex human societies) as entities regulated by causative laws to decipher and, once known, to apply.

On the other hand, ethics has maintained through centuries a sort of immunization against the hegemony of the "efficient cause" idea, vice versa maintaining the "final cause" as one of the main factors determining the behaviour of human beings, and as such of societies, nations, and as one of the keys to interpret the evolution (development and decline) of civilizations throughout centuries.

Geoethics is part of the ethics and therefore is on the other side of the ocean with respect to the bulk of geosciences. There is a sort of cultural barrier or divide between geosciences and geoethics. Despite the apparent success in recent years of geoethics in the geoscience community, there is still a clear mistrust or at least caution geoscientists feel on geoethical themes. This is mainly the result of the educational system where the two branches of disciplines ("efficient cause" -based and "final cause"-based) are treated separately especially at academic level, which reflects heavily in the research and professional post-academic geoscientists worlds.