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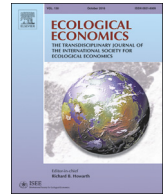
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Commentary

Obituary: Giorgio Nebbia (1926–2019)

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Giorgio Nebbia was among the first and most important Italian environmentalists, although in his particular and heterodox way. Marxist and Catholic, between 1983 and 1992 he was a member of parliament for the independent left, and as a political figure he tried to instill the ecological thinking into left wing parties, at that time so committed to development and growth.

Though not a member himself of the Club of Rome, he fought, intellectually and politically, to spread the concept of *limits to growth* and began publishing as early as in the 1960s on the potential conflict between humans and Nature in the domain of technology, the *technosphere*, as Giorgio used to call it, and that of ecological processes, the *biosphere*. He dedicated his entire life seeking a theoretical and political ground for reconciling economy with ecology, within the frame of a more just and equitable society and a particular attention on the role of the working class in this strain.

Social justice and ecological reconciliation were not separable in the thought and activism of Giorgio. This apparent contradiction, which is becoming increasingly imminent today, is one of its main moral legacies. In the time of the *end of history*, when the social conflict was subsiding or at least becoming less apparent and the impending environmental crisis was drawing the attention in the public debate, he never accustomed with the idea that capitalism eventually triumphed and poverty was about to be eradicated, in the west and in the rest of the World. He foresaw the problem of reducing poverty without fossil fuels (Nebbia, 2001).

Giorgio Nebbia was also a great scientist and a precursor of the interbreeding between social and hard sciences. A chemist by education, in 1959 Nebbia became a professor at the Faculty of Economics of the University of Bari, of *merceologia*, an Italian word that could be hardly translated in *commodity* and an old discipline (Warenkunde, in German) that studies the production, characteristics and use of goods with a scientific approach. During his entire academic career he pursued the goal of applying physical laws to the study of economics and laid the foundations for a solid physical accounting of intersectoral economic analysis at a time when this approach was new (Physical Input Output Tables, or *PIOT*).

As a scientist of his generation, his work and reputation was mainly confined to the Italian context and only few publications are available in English. Nevertheless, remarkably, several international scholars acknowledged his seminal work as one of the first studies on physical

input output tables (Giljum and Hubacek, 2001; Hoekstra and Van Den Bergh, 2002; Allenby, 2002). His first and to date only study of the global mass flows processed by the Italian economy in 1995 has the peculiar, perhaps unique, feature of embedding the economic system within the biophysical system (Nebbia, 2000). In his tables, an entry named “Natura” is designed to balance all material flows through the economic matrix in order to fulfill the conservation law and to reflect the intake and disposal, from and to the hosting ecosystem. Despite being written in Italian, this work is widely cited in the scientific literature and a recent international project aimed at estimating the global physical input-output tables gave reconnaissance to his contribution (Merciai and Schmidt, 2018).

The perseverance and the coherence with which he has sustained the environmental cause, as well as the scientific rigor with which he did it, are his greatest bequest. As a tribute to him on the occasion of his 90th birthday, on May 10, 2016, a conference on his legacy was held in the Italian Senate in Rome. The proceedings (in Italian) have been published by “Fondazione Micheletti” (Andria et al., 2016), a foundation that makes available on its website many of the newspaper articles on environmental issues that Nebbia was used to write (see <http://www.fondazionemicheletti.it/nebbia/>).

On 4 July 2019, at the age of ninety-three, Giorgio Nebbia died in Rome, Italy. We, as scholars and as activists, are grateful to his lesson, for the relentless motivation he showed us and for the moral and intellectual example to follow on the road to change, towards a better and sustainable society.

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