Thesis Proposals

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1 Social choice for Sustainability (ScS)

Environmental sustainability involves solving two very complex problems: 1) the implementation of fair protocols to manage natural resources and the environmental costs associated with their use; and 2) the design of indexes to measure the impact of human activities on multiple environmental dimensions through the use of natural resources. Alternative approaches based on social choice theory have been proposed to tackle these problems in distinct scenarios. Axiomatic methods for allocating natural resources have been proposed using cooperative game theory [6] as well as to distribute CO2 emissions permits [2]. Social choice and voting theory have been widely applied to solve problems related to the management of natural resources [1, 5]. A plethora of environmental indexes have been proposed during the past years using a multi-criteria approach [4, 8, 7] or following an axiomatic approach aimed at characterizing indexes based on multi-dimensional environment states [3].

Very often, the fundamental properties used to design protocols for the management or the allocation of resources and those for designing environmental indexes, exhibit strong similarities. Therefore, as a first task, the PhD candidate will have the opportunity to study the existing axiomatic studies of resource allocation protocols and environmental indexes from the literature, highlighting possible analogies based on alternative interpretations of very similar axioms.

On the other hand, the problem of managing natural resources and that of measuring the impact of their use are closely interconnected. Each allocation protocol or management procedure has a different impact on multiple dimensions and this impact must be measured with an appropriate index across space and time. Conversely, the choice of the method for measuring the impact of human activities can directly affect the selection of policies for resource rationing. So, as a second task, the PhD candidate will be faced with the problem of studying the reciprocal relationship between a resource allocation protocol and an environmental index and will try to characterize their relations on an axiomatic basis.

References

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