Resource Dependent Branching Processes and the Envelopment Theorem for Societies

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Any human society that wants to survive and that prefers, at the same time, a higher standard of living to a lower one, is finally bound to stay in the envelope defined by exactly two extreme kinds of society. This is the final conclusion of our study of so-called Resource Dependent Branching Processes (Bruss and Duerinckx, 2012). Such processes model the growth of populations in which individuals need resources and have to create new resources to be able to live, and where the policy of resource distribution defines the society structure. We prove that exactly two such processes form an envelope, in the sense that all others have to live in the long run between these boundaries. This result is paralleled by explicit criticality criteria for survival of both enveloping societies. Furthermore, the extreme processes are interestingly related with society forms we believe to recognise rather well: it seems that, with respect to societies, mankind has already come close to testing the limits.