

Chapter 16

Conclusions: Re-Evaluating Boserup in the Light of the Contributions to this Volume

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Abstract In this concluding chapter, we repeat and try to answer the book's core questions: In what regards was Ester Boserup a visionary? How has her work become point of departure for following generations of scientists? How did her work influence the authors' own research agenda? In what ways has later research transgressed or contradicted her approaches? And finally: How can her work be used to enhance sustainability science today?

Keywords agricultural development · gender roles · technological transformation · land and labour intensity · comparative case studies · long-term socioecological research · environmental history

In the closing session to the conference in memoriam Ester Boserup's 100th birthday that evoked the contributions now assembled in this book, the following four questions were asked.

1. In what regards was Ester Boserup a visionary? How has her work become point of departure for following generations of scientists?
2. How did her work influence your own research agenda?
3. In what ways has later research transgressed or contradicted her approaches?
4. How can her work be used to enhance sustainability science today?

These questions evoked a rich and lively discussion, which could not be easily captured in a concluding statement. The main lines of thought emerging from the conference closing session provide, together with the written contributions presented on the previous pages, a basis for a set of conclusive reflections in terms of answers to two broad overarching questions: on the one hand, asking about the influence of

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Ester Boserup's work on the contemporary research, on the other hand, asking about new directions of research transgressing or challenging Ester Boserup's perspectives.

16.1 In What Ways Did Ester Boserup's Work Influence the Research Agenda of the Contributors to this Volume?

The original work of Ester Boserup was not only interdisciplinary to a degree rare at the time of her writing, and thus spread across and influenced many disciplinary fields, it was also synthetic and holistic in nature. The mind-set she presented aimed to condense a wide array of considerations and observations into simple but nevertheless compelling and general theses. These apparently reductionist generalizations were helpful to inform, stimulate and provoke further research. We will use some of the main themes that she considered for generalizations to structure the insights offered by this book.

16.1.1 Population Growth Leading into a Malthusian Trap or to Productive Innovations?

Already her early book on agricultural change (Boserup 1965) reopened the enduring theme of population growth and environmental resources: is it a Malthusian trap, with population growth overstressing natural resources, or does it primarily work the Boserupian way, with population growth stimulating technological innovation and opening new avenues for development?

The authors in this volume frame this alternative in various ways, and therefore also come up with different answers. In Chap. 3, Fischer-Kowalski et al. confirm the Boserupian version by demonstrating, on a global level for the twentieth century, a non-linear relation of population and the use of land: population growth exceeded the amount of additional cropland drawn into use by far. The opposite, though, is true for the human use of material resources: their use expanded much beyond population. Boserup's hypothesis of the beneficial effect of increased human collaboration under conditions of higher density, on the other hand, was confirmed also for energy and materials use.

Lemmen in Chap. 6 deals with the global historical transition from foraging to agriculture, and refers to Boserup's later (1996) more generalized framework, appreciating the elements of classical political economy behind it. His GLUES model though, based upon this thinking, comes up with ambiguous results: is the transition from foraging to agriculture driven by population growth (Boserupian), or is it technology driven (Malthusian)?

Birch-Thomsen and Reenberg in Chap. 4 also employ Boserup's generalized (1996) model as a heuristic framework when they investigate the impact of population growth on changing land use practices on a Solomon island between 1960

and 2006. They find the substantial population growth of that period to have had relatively little impact on changing land use practices, but they see other innovations such as a diversification of livelihood pathways (labour migration, non-agricultural occupations) facilitated by globalization as more relevant solutions.

16.1.2 Land Use Intensification and its Drivers

Another prominent theme, which runs through several chapters, is the issue of land use intensification and how it may be induced by growth in population and demand.

In Chap. 5, Erb et al. underline the Boserupian (1965, 1981) emphasis on land use intensification and the need to analyse the complex interaction between social and natural systems in order to understand the change processes. Starting from what they call Boserup's "input side oriented definition" of land use intensity, as indicated by the frequency of cropping, they develop and compare complementary indicators such as technological efficiency, the " τ factor", and human appropriation of net primary production (HANPP). By doing this, they pay tribute to Boserup's early contribution but see the need to go beyond it.

Infante-Amate et al. in Chap. 7 present a case study on a community in the south of Spain for which they have assembled detailed data on population and land use for the period 1750–2000. Their key dependent variable is soil degradation and soil loss in olive tree plantations, which they see as unintended long-term consequence of various forms of land use intensification. In this context, they ask, what explanatory value does population growth, the Boserupian (1965, 1981) key variable, have? The issue turns out to be more complex than immediately anticipated, with causal loops varying by time period and circumstances. Hence, the authors see the Boserupian explanation as valid for some periods, but as insufficient to explore the transition from traditional to fossil fuel based agriculture.

Chapter 12 by Behrman et al., while focussing mainly on gender aspects, discusses the introduction of mechanized production methods in the context of large scale land deals by (mostly) foreign investors. According to their findings, these innovations impact both local men and women, creating disadvantages and benefits for both, but in different ways. Clearly, the drivers of these changes are not rooted in local or regional population growth, but on the global level (in biofuel policies, for example).

16.1.3 Labour Time and Labour Productivity

Labour time was presented by Boserup (1965, 1981) as an important factor in her basic hypothesis about drivers of technological change: population pressure triggers technological change which is increasing yields at the expense of labour time.

Ringhofer et al. in Chap. 8 compare four local communities (mostly from tropical regions) which they order on a "developmental axis" to probe into Boserup's

hypothesis. They find compliance with her hypothesis among the subsistence agriculture cases. In the hunting and gathering community, they find both land productivity and labour productivity to be much higher than in any other case. On the other end, the transition to the use of fossil fuels in agriculture provides a decoupling from (rising) labour intensity. When they translate human labour into energy and add fossil fuel input, they find a continuous decline of energy return on energy input (EROI) along their developmental axis—hence, they present a quite non-Boserupian storyline.

In Chap. 14, Smetschka and Gaube present a case study on a contemporary Austrian rural community. They adopt Boserup's interest in the use of time and find labour time to be a highly relevant and useful element in their agent based land use model. It helps to maintain the attention to the fact that labour time, even under conditions of industrial agriculture, particularly of women, matters in decision making about land use as much as income does.

16.1.4 Genderizing Development

A number of chapters in this book elaborate on Boserup's (1970) thesis that Western-led development policies were blind for the key role of women in agriculture and in effect reduced their status and opportunities, while for successful development just the opposite was required.

Lachenmann in Chap. 9 addresses the “invisibility of women's work” on policy levels and expresses the need of “engendering development”, pleading for Boserup's (1970) message to be more seriously taken into account. Nwakeze and Schaffartzik in Chap. 11 take point of departure in an empirical example from contemporary sub-Saharan Africa (which Boserup had considered a region of female farming par excellence). They demonstrate a strong positive link between gender equality (GII index for nations) on the one hand, and income (GDP/capita) as well as the degree of human development (HDI) on the other. They are also able to show that increasing gender equality is associated to declining fertility rates (TFR). While causalities of course are hard to establish, the empirical associations provide a compelling support in favour of Boserup's hypothesis.

Chapter 10 by Gooch presents related results for India. Building upon an older study by Miller (1981) that had demonstrated female child survival rates across India to be associated to the importance of female labour in agriculture, she compares two communities in the Himalaya region. The results show female child survival rates to equal male rates in situations where labour intensification in agriculture requires much female work. She also demonstrates that there is a strong preference for sons and their survival in places where de-intensification of farming occurred because of low land productivity.

In Chap. 12 Behrman discusses contemporary large scale land deals. They are perceived as a type of industrial land use intensification, and the analytical lens employed is directed towards the question of whether these “land-grabs”, in their consequences for males and females, comply to Boserup's (1965) theoretical assumptions. She

concludes that these land use changes are very different from endogenously induced technological change in agriculture; also the gender impacts should be expected to be complex, but not necessarily in compliance with Boserup's reasoning.

Schmook et al. analyse the genderization of land rights in six Mexican communities across the last decades. They come to the conclusion that a number of mechanisms work in favour of women increasingly acquiring formal land rights. On the one hand, male labour migration (usually to the US) has the obvious consequence that the males are not present when formal rights are being legally re-distributed. On the other hand, females frequently invest the money they earn for example in tourism in agricultural assets.

Teherani-Krönner in Chap. 15 finally attempts to link Boserup's (1970) ideas about the role of gender in the economy to O. D. Duncan's "mind model" of human ecology. It is, in other words, proposed to incorporate Boserup's work into the theoretical foundations of human ecology.

16.2 In What Respects Does the Research Presented in this Volume Transgress, or Even Contradict, Boserup's Work?

The great merit of Boserup seems not to have been right in all details of her observations, but rather to have succeeded to come forward with concise assertions of an adequate level of surprise and complexity so to invite research to follow up on it. By and large, her description of the functioning of agrarian communities and their modes of evolving seems to inform historical analysis very well and to comply with the outcomes in general terms. This is not so for the transition to industrialized agriculture. There is not one single contribution in this volume that confirms Boserup's basic developmental hypotheses for this transition stage of the process.

In Chap. 3, Fischer-Kowalski et al. demonstrate with Boserup's own (1981) data that apparently she was so entangled in her model of gradualism that she overlooked the specific impact of the introduction of fossil fuel. Fossil fuel based technologies created a qualitatively new situation in which a rising demand for work no more relied on human (or animal) labour but on agro chemistry and mechanization. Therefore the previous pattern of increasing yield at the expense of the human labour made available by population growth did not hold any more. Instead, the excess labour was driven into urban agglomerations.

Similarly, Birch-Thomson and Reenberg in Chap. 4 demonstrate that continuing population growth on a tropical island did not so much result in intensification of land use, but rather in new occupations permitted by fossil fuel based transport of tourists to the island.

Infante-Amate et al. in Chap. 7 analyse the reasons for intensified use and soil degradation in olive stands in southern Spain across a time period of 250 years. For more recent time periods, they reject the Boserupian hypothesis of population growth as a driver of land use intensification; while the local population even declines, the excessive use of tractors and agrochemicals (based upon fossil fuels) to produce olive oil for the global market drives land use intensification and soil degradation.

Finally, Ringhofer et al. demonstrate very clearly that the Boserupian mechanism of increasing yields at the expense of labour input holds only for subsistence agriculture. As soon as fossil fuels come into play, it is necessary to resort to a more generalized concept of energy inputs in order to arrive at consistent explanatory models.

In effect, it seems that Boserup's gradualist model of development does not hold when it comes to the transition to fossil fuel based industrial society in which land is no more the key resource. This shift in energy regime (as described in Chap. 3) seems to be more relevant and powerful than Boserup would admit.

It is not so clear whether similar limitations to her model hold as far as gender relations are concerned. All the chapters dealing with the role of gender relations recognize their often underestimated importance in development. Empirical confirmations arise mainly in those chapters that deal with early stages of development, such as in Chap. 10 for the Himalaya region in India, or in Chap. 11 for sub-Saharan Africa. In cases dealing with more advanced industrial situations, such as Chap. 12 about contemporary large scale land deals, or Chap. 13 about contemporary Mexican communities, the storyline appears to be more mixed: It is not so clear that females tend to be disadvantaged by development over their previous traditional roles, but sometimes it seems to work the other way round.

Many of the contributions to this volume reflect that it seems more difficult for contemporary human-environmental scientists to share Boserup's in principle positive and optimistic outlook into the future. Several environmental pressures appear to have evolved in a way that demonstrate a Malthusian rather than in a Boserupian pathway: more people on earth imply an accelerating rise in the exploitation of natural resources. In particular it has been noted that, if not so much land, so many other resource uses rise over proportionally to population (see Chap. 3). Today, it is much more apparent than at the time of Boserup's writing that development has not been following the transition pathway she propagated, but in much of the world rather resembled a 'gold rush' leaving barren land behind. The "limits to growth" notion that Boserup would not take into consideration (although she was aware of Meadows' et al. 1972 publication) seems to deserve more attention nowadays.

For several reasons—such as her insistence in gradualism, her deep rooted trust in positive outcomes, and her neglect of energy sources as marking qualitative breaks in societal development—it is difficult to learn a lesson from her concerning a next transition to a more sustainable society. It seems she believed the society she inhabited made mistakes but was ok (or the only option) after all.

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