

Article

How Organic Farming Can Become a Driver of Sustainability, and How Its Study Reveals the (un-) Consistency of Sustainability Indicators and Strategies

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ABSTRACT

Global sustainability will self-evidently determine the outcome of the 21st century, and all further history of humanity. This is by far the largest management problem humanity has ever faced. Yet (or as a consequence), not only an adequate global answer to this question, but a comprehensive global effort or motivation for it is far from reality. We should therefore pay increased attention to forerunner economic sectors and trends in social change. In this paper, we begin with studying organic farming as such a forerunner and potential initiator of sustainability transition in other sectors, socioeconomic structures and activities; as well as patterns of its propagation and its connection with other sustainability trends beyond agriculture. Our goal is to understand which factors are essential, and which are indifferent in shaping a more rapidly extending and economically successful organic agriculture in the near future as a vital part of global sustainability transition. On this course of investigation, however, we end up discussing a wider range of indicators of sustainability, arriving at ambivalent, or even worrying conclusions regarding the overall landscape of possible sustainability strategies in the light of multidimensional indicator inconsistencies. Inconsistencies suggest that environmental sustainability is simply set to be neglected, even if we efficiently go towards the current sustainable development goals (SDG's) of the United Nations.

KEYWORDS: organic farming; global sustainability; multidimensional sustainability; UN SDG's; indicator consistency; policy evaluation

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ABBREVIATIONS

SDG, sustainable development goals of the United Nations

INTRODUCTION

The statement that sustainability is by far the most important and history-shaping goal for humanity in the 21st century, seems to be trivial now [1–4]. At least we know its importance, but still, we are globally desperately lagging behind the sufficient course of becoming sustainable enough to survive the critical period [5,6]. As the most striking indicator of this insufficiency, we can take a look at the greenhouse gas emission trajectory: although the internationally agreed-upon goals of the Paris Agreement imply ca. halving the global emissions with respect to the peak until 2030 [7], we have not even reached the peak itself yet. Five years ahead of the halving milestone, the emissions are still rising [8,9].

This lack of readiness well illustrates that the problem of global sustainability is not only the most important, but also (by far) the most complex and difficult socioeconomic transformation process that humanity has ever faced in its history. We know and see the problem, we know and see its magnitude, but in spite of serious (yet sparse) efforts towards it, the adequate solution is not within reach. In this situation, we focus our research program on searching for all the possible traces of activities and prospects of change which can lead to sustainable practices and systematic transformations “simply” by extending the scope of existing practices, patterns of management, etc. Among these patterns to extend and follow, there are management principles from military logistics [10], as well as technological simplifications (as opposed to new technologies) [11] in our everyday background, where we face limitations to competition and growth, the chief maxims of nowadays economic and societal systems.

Another such pattern to follow and extend and therefore to be investigated is organic farming in our studies as a focal point in today’s consumeristic society, being a production sector in which some aspect of sustainability has been already able to become a main feature, and this can radiate into e.g., supply chains, other parts of agriculture, food industry, related sectors and connected consumption habits (see e.g., in [12–14]). As a crucial part of its possible influence, the overall internal fitness of organic agriculture has to be also studied; which means its strength to grow, as well as its inner coherence with other aspects of wide-range sustainability, e.g., short supply chains.

LITERATURE CONTEXT AND RECENT DEVELOPMENT

Multidimensional Sustainability Benchmarking

Comparison and interdependencies of multiple indicators and proxies of sustainability performance should be embedded into the environment of recent studies of multidimensional sustainability analysis. This methodology is the key for measuring overall sustainability performances which reflect performances in several fields of sustainability in a properly combined way [15,16]. This is the instrument which overcomes the

challenge of unifying diverse, possibly even incomparable aspects of the question in a quantitative way; thus, giving the very ability to fundamentally gauge the problem [17], a performance indicator on the way towards the solution, a measure of the remaining part, and a benchmark for both strategy making, and implementation of strategies.

However, when we are exploring the multidimensional sustainability landscape in our present paper by comparing single-aspect indicators (and proxies) with each other, we are going back into the detailed view, especially the problematic of integrating these all into efficient combined indicators which are not only mathematically sound, but useful and stimulating as a driver of strategy making and policy benchmarking in sustainability policies.

As we are starting with the global landscape of organic farming in the light of other sustainability benchmarks, and later turn out to compare a much wider range of indicators as an overall landscape, we also have to cite here the literature reflecting the most recent development in studying the intersectoral connections of organic farming, and more generally, sustainable agriculture in the multi-aspect network of sustainability practices and interactions. This can cover cases when agriculture affects the environment [18] (and other aspects of human life through it), and also when deterioration of environmental parameters, most importantly climate change, affect agriculture [19,20]. Intersectoral connections of (organic) agriculture, not on the overall economy-wide indicator level, but on the microeconomic level of consumer and supplier decisions form the basis of our hope for organic farming as a forerunner of sustainability in general. This side has been studied by us in the recent years [21,22].

Our Previous Results

As a possible way of influence, we have studied the presence of organic products in the lifestyle and habits of Z-generation consumers [21], the generation which will supervise the great transition (or non-transition [23]) of humanity into the era of sustainability. In this study we used a survey to explore the patterns of sustainable thinking, and we have found that while an overall concept of sustainability which can be used then as an underlying self-management tool in every aspect of life is not observable, the traces of such a structure can be found around the consumption habits of organic food, showing a loose internal consistence, and slightly extending into correlations with e.g., food consumption in general, and waste consciousness.

We have investigated the consumer and producer trends about organic sector in general [22]. This constitutes the possible fundamentals of spreading the idea of sustainability beyond the organic sector in the narrow sense; and can therefore fuel creating a strong socioeconomic network of sustainable economy starting from the organic sector. We have also investigated the strength and growth patterns of organic farming

globally, in Europe, and in Hungary, and tried to assess the future prospects and leaders of growth.

In the above and other investigations, we have come to the conclusion that while the farmers are becoming more and more conscious about sustainability in the organic sector (and possibly outside it), they do not (want to) understand well the preferences of their consumers, regardless if it is parallel or contrary to theirs, and the sector as a whole is not conscious about applying the concept of sustainability in general, e.g., building supply chains along the principles of sustainable logistics.

MATERIALS AND METHODS

In order to assess the above “sustainable-network-ability” of the global organic sector, we simply pairwise compare performance indicators of countries both in organic farming, and sustainability in general. Just like in our paper about Z-generation consumption habits and lifestyle elements [21], we use normalized covariances (Pearson correlation coefficients, generalized cosines of datasets as multidimensional vectors [24]) for the measurement of datasets’ relatedness or antagonism with respect to each other. The statistical sample is the list of countries (and some other territories) of the world, and similarities and differences of data rows are taken along this sample as the above correlation coefficients. They are then interpreted as statistical representatives of harmonies or contradictions between the underlying real tendencies. Cumulative statistical quantities (means, correlations, etc.) are calculated with weighting by population, in order to improve relevance as human-population-wise measures, but this is anyway a natural choice when data is dominated by per-capita-type indicators. (Anyway, even if there were arguments for another weighting in our discussion of basic trends—e.g., countries on their own, without population weights, if variances in governmental efforts one-to-one are seen of utmost importance—it would be not a problem if we used estimators of lesser than maximum efficiency for the correlation coefficients.)

As for the indicators of general sustainability, we consider using the following ones.

- The ecological footprint [25] per capita (both from the consumption and production side)
- GDP (as per capita, and at purchasing power parity) [26], as well as indicators composed of the footprint and GDP indicators (we considered these in order to award sustainability efforts and tendencies in developed countries too, if observable).
- Initially we considered a partial set of SDG indicators, especially those related to environmental sustainability, but to get a broader picture, as well as an overview of full SDG set consistency, we finally used the full set of 17 main SDG indicators [27]. (Note that these 17 SDG indicators are themselves compound indices in the 0–100 range, compiled

according to their respective methodologies [28] out of multiple partial indicators.)

The countrywise indicators of the organic sector which we considered include the ones below.

- The total amount of organic farmland as an absolute indicator of sector magnitude [29].
- The relative ratio of organic farmland within the agricultural sector of countries [29].
- The ratio of a country's total organic farmland with respect to the global total amount, as an absolute share from the global upstream organic market.
- The total consumption (total value of retail sales) of organic food in the countries [30].
- The ratio of the total consumption of countries to the global market as an absolute share from the global downstream organic market.
- Purchasing-power-parity-adjusted versions of the above two, where we used IMF PPP data [26] (we considered Big Mac Index [31] too, but nonetheless a direct measure of "western-type" food purchasing power parity, it is geographically rather limited).

Besides the comparison of indicators across organic farming and general sustainability, we also study indicators of either side on their own, in order to check consistency, as well as to create insightful visualizations showing their global shape.

RESULTS

In addition to the chief goal, i.e., evaluating the relation between patterns and trends in organic agriculture and overall sustainability, the comprehensive processing of global sustainability and organic agricultural data produced maps and other visualizations on the shape of the global organic market, showing patterns not well aligned to sustainability principles. Furthermore, we have got a worrying coarse global landscape of sustainability indicators, which draws the observer's attention even after minimal statistical evaluation of indicator data.

Visualizations of the Global Organic Market

Figure 1 shows the global distribution of organic farmland by color shades representing countrywise share in total agricultural land. The most notable feature of the map is the uneven distribution. Outside Europe, only some island territories, Australia, and Uruguay manage to get above 5%. It must be noted that with its vast cropland and a little below 15% organic share in it, Australia is by far the largest member on the global market (comprising more than half of the global organic farmland area). The largest countries with organic cropland shares of 1–5% (Argentina, India, Canada) join in as further major players.

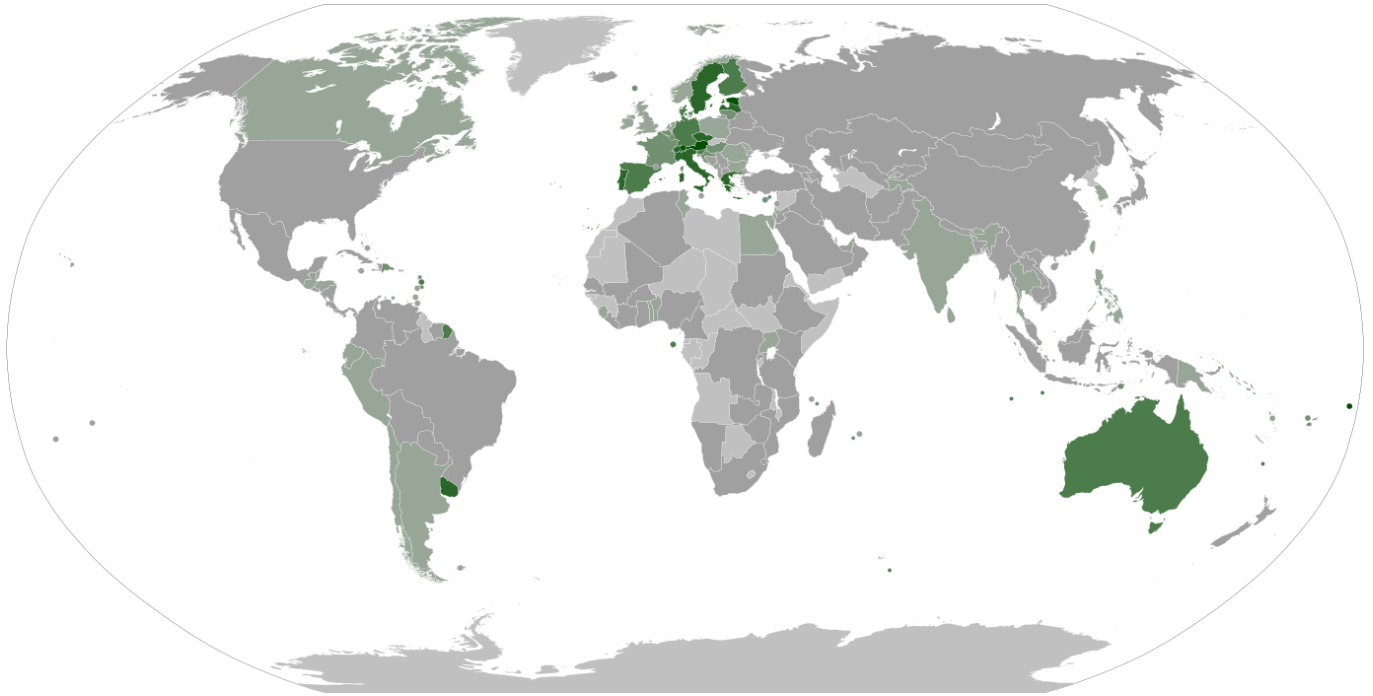


Figure 1. Global distribution of organic farmland; share in countrywise cropland area (data from 2022 [29], map frame from Wikimedia Commons [32]). Light grey: no data, darker grey: under 1%, greens: up to 5%, 10%, 15%, 20%, and above 20%.

The uneven global distribution of organic production and consumption can be seen in Figure 2 (which can be regarded as a clear sign of no general sustainability consciousness in the organic market, since this situation unavoidably leads to long global supply chains). In order to compare the production (“upstream”) and consumption (“downstream”) sides of the global market, we calculated both in terms of global market share. In production, this means share in global organic farmland; in consumption, this means share in global retail value (taken at purchasing power parity). The striking asymmetry of the two distributions result in countries with export-oriented and import-oriented organic sectors, while autarchy remains only a faint possibility even in balanced economies (production-consumption global share ratio between 1/2 and 2).

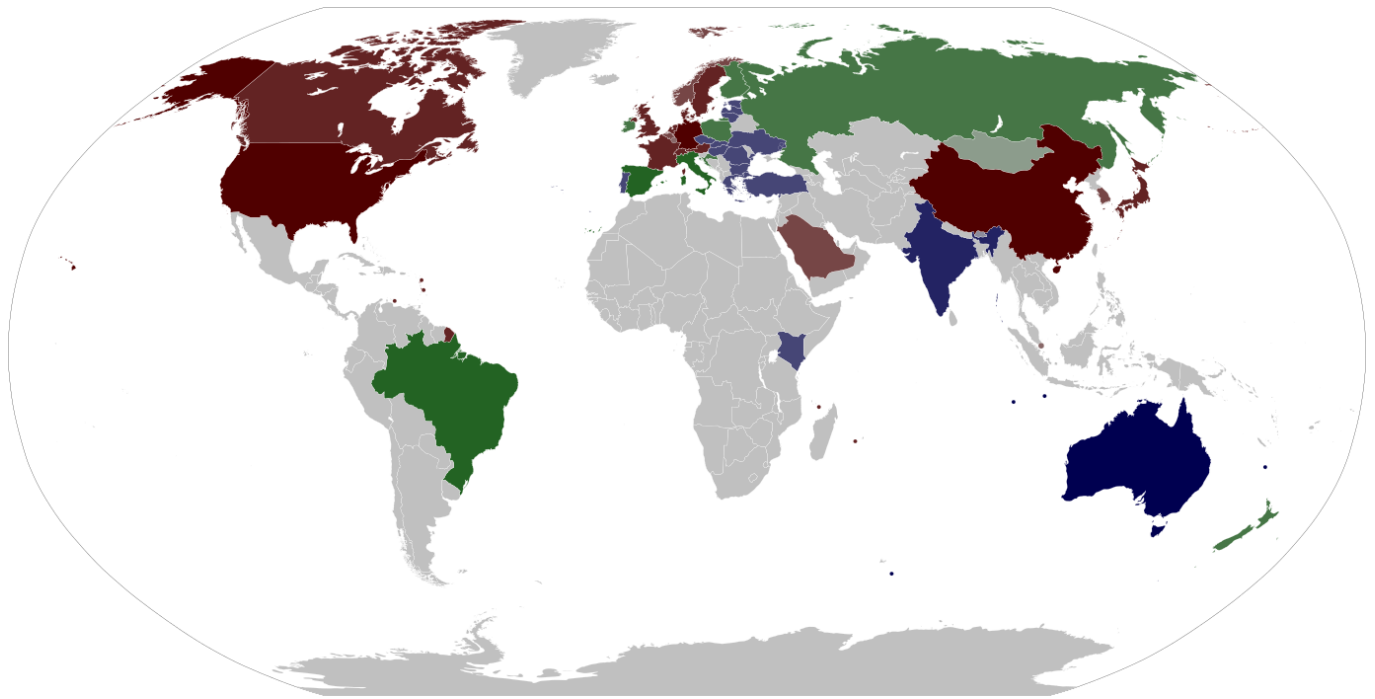


Figure 2. The asymmetry of organic products world trade (compiled from FiBL data, 2022 [29,30], map frame from Wikimedia Commons [32]). Red shades: importers, blue shades: exporters, green shades: balanced ($0.5 < \text{production/consumption} < 2$); darkenesses represent global market share (maximum of upstream and downstream global shares) on a logarithmic scale (shares above 1/10, under 1/10, under 1/100, under 1/1000).

As for the short-term future prospects of organic production, it is worth displaying the data of major global players in a BCG-matrix-like [33] setting, drawn in Figure 3. This figure not only highlights the most important players on the global organic market today (because of their far outlying points, Australia, by far the largest producer, and India, the fastest-growing member are omitted), but also gives a hint about how this market will look like in the near future (points near the top will move to the right, thus reaching larger market shares).

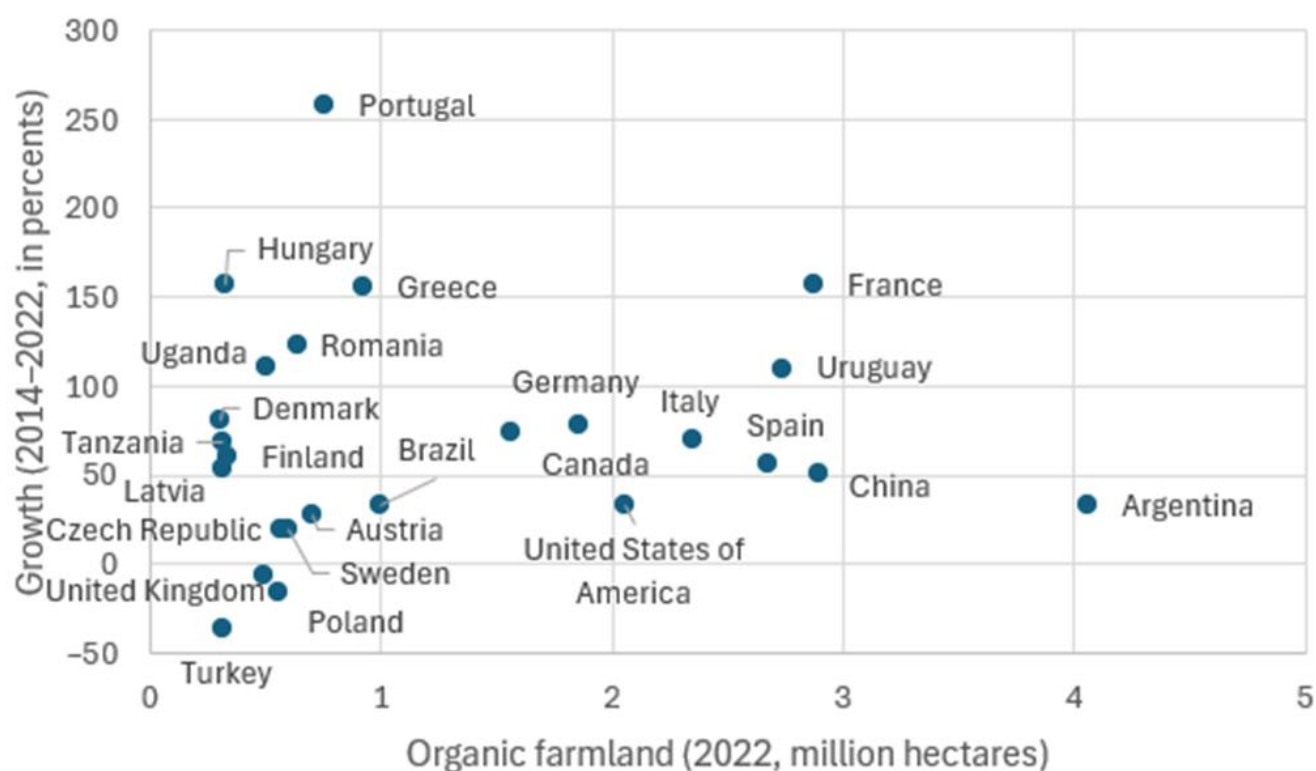


Figure 3. A BCG-matrix-like plot of the major global players (with organic farming area larger than 0.3 million hectares in 2022). Note that the largest producer, Australia (more than 53 million hectares, 133% growth) is far to the right beyond the plotted area, and India, the fastest-growing one (4.7 million hectares, 556% growth) is well above, and therefore they are omitted for technical reasons. The growth rate is for 8 years (2014–2022, chosen for convenience of the availability of data [29]).

Connectedness between Organic Farming and General Sustainability Patterns

Now we arrive at the first main goal of this paper; evaluating the patterns of connectedness between organic agriculture as a narrow part of the sought-after sustainable economy of near future, and overall sustainability indicators. Can we identify organic farming as a forerunner of sustainability transition as a whole, or the overall efforts of sustainability as a helping environment for developing organic agriculture? There are no convincing overall results about organic farming in the language of macroeconomic sustainability indicators: correlations in Figure 6 show that countrywise indicators of organic farming are not well-aligned with environmental sustainability. They are aligned with indicators about societal and economic sustainability, which in turn, are definitely antagonistic to environment-oriented ones.

And this is the point where we get to the (emerging) second goal. Our analysis has given another interesting result: it has ended with important indications about sustainability as a general concept in global policymaking, too.

In order to explore general sustainability patterns a bit further (and connect them to UN SDG indicators), we planned to use ecological footprint

(and derivatives), originally, and the subset for environmental sustainability of the United Nations' sustainable development goals (SDG's), but finally, it seemed to be a relevant general consistency check to include them all. It is worth reiterating what SDG's are (Figure 4) [27]. As it can be seen in Figure 6, the results of searching for general patterns are already striking within the scope of SDG's only. SDG's 1 through 9, and 11, 16 group into a subset by correlation. Let us say, this is a group about traditional personal wellbeing in a social market economy of the 20th century; as this subset correlates with ecological footprint and GDP, the traditional indicators of economic growth.

1	Eliminating poverty	2	Eliminating hunger	3	Health and personal wellbeing
4	Education	5	Gender equality	6	Clean water and sanitation
7	Affordable and clean energy	8	Decent work with growth prospect	9	Industry, innovation and infrastructure
10	Reducing inequalities	11	Cities and communities	12	Responsible consumption, production
13	Climate action	14	Life in the sea	15	Life on land
16	Peace and rule of law	17	Solidarity across society		

Figure 4. Sustainable development goals of the United Nations [27].

Next to this group of “consumeristic” SDG's, there is a group of four, of which SDG's 12 and 13 (responsible consumption and production, and climate awareness) are more tightly interconnected, while 14 and 15 (life in water and land) are connected loosely. These seem to be the indicators of “real” (environmental) sustainability, and they are in negative correlation (showing antagonism!) to the former group for the tightly interconnected, and nearly neutral, slightly negative correlation for the loose members. As an illustrative example, see the fact that only underdeveloped countries score well in SDG 12 [27], while it seems to be easier for a camel to pass through the eye of the needle than for even a moderately developed country to reach high score in it (Figure 5). Consumption behavior is anyway one of the toughest aspects of sustainability at the individual level [34,35,21]; and now we see that not only traditional wealth indicators, but fulfilment of effectively all societal SDG's encourage high consumption levels. Therefore, the implementation (or spontaneous evolution) of all SDG's as a whole cannot be seen as a consistent marking feature of convergence to environmental sustainability. Moreover, the relative sizes of the two SDG groups ensure that scoring high in the overall SDG index gives a score *contrary* to the

ability to cope with our century's environmental sustainability crises; especially by far the most important one, climate change.

SDG's 10 (inequalities) and 17 (higher solidarity) do not show connection to any of the former SDG subsets (SDG 10 shows a natural correlation to SDG 1 about poverty, however). On the inner inconsistencies of the SDG indices and other sustainability indicators, other aspects and further details can be read in the literature [36].

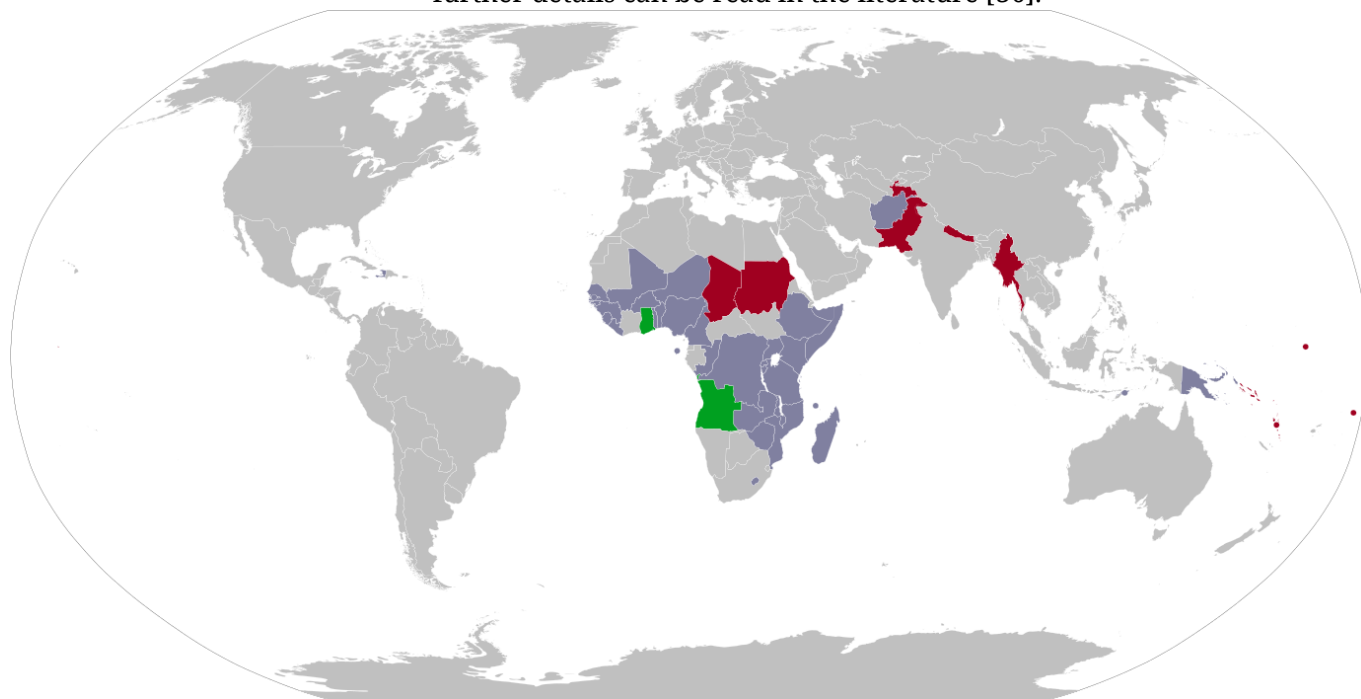


Figure 5. At the level of general (direct or indirect) indicators of sustainability: how does low GDP and ‘responsible’ consumption relate to each other? Bluish hue: GDP (PPP) under 7000 international dollars per capita in 2023, and SDG 12 score above 93 in 2022; green: GDP and SDG 12 score both above the threshold, dark red: both below the respective thresholds. See how little number of countries break the strong relation between low GDP and austere consumption (29 non-microstates showing the relation, 2 green countries, 6 dark red non-microstates).

Next, it is important how the indicators of organic farming relate to the above subsets of SDG's, as well as the other indicators of (un-) sustainability. The resulting picture is at least ambivalent. As the appropriate columns in Figure 6 show, the main volumetric indicators of production and consumption of organic agriculture (organic share in farmland, and consumption adjusted with GDP to eliminate direct effects of wealth) show weak but not negligible correlation with the larger, “non-environmental” group of SDG's, as well as with ecological footprint and GDP (as a further pessimistic result, the two kinds of ecological footprint and GDP form another tightly connected group, which is a clear sign of their lack of decoupling [36]), while they show negative correlation to SDG's 12 and 13 (this puts them on the “consumerist” side), and loose positive one to 14 and 15 (just like the SDG's already on the “consumerist” side).

As for the qualitative adjectives, e.g., “loose connection”, “weak correlation”, etc., it must be noted that the relevant sample sizes behind Figure 6 are all above 150 (data rows from 184 countries and territories, but elements with missing or useless data eliminated), and therefore significances of linear correlations are all over the $p = 0.95$ level for every value near or above 0.2 (with the small uncertainty coming from sample weighting also taken into account). This means that every color shade which “catches the eye” is showing significant correlation (for exact correlation values, see the underlying numbers); thus, contributing to the worrying coarse landscape.

	sdg1	sdg2	sdg3	sdg4	sdg5	sdg6	sdg7	sdg8	sdg9	sdg10	sdg11	sdg12	sdg13	sdg14	sdg15	sdg16	sdg17	Org%	Prod	Cons	GDP	X	Y
sdg1	1.00	0.49	0.74	0.73	0.36	0.60	0.75	0.51	0.69	0.42	0.53	-0.46	-0.23	-0.15	-0.25	0.56	0.12	0.19	0.34	0.37	0.39	0.09	0.45
sdg2	0.49	1.00	0.76	0.62	0.79	0.81	0.50	0.55	0.79	0.06	0.64	-0.43	-0.35	-0.25	0.07	0.68	0.12	0.06	0.53	0.61	0.49	0.37	0.14
sdg3	0.74	0.76	1.00	0.82	0.70	0.85	0.83	0.63	0.89	0.17	0.85	-0.67	-0.50	-0.18	-0.03	0.85	0.29	0.28	0.64	0.70	0.68	0.31	0.45
sdg4	0.73	0.62	0.82	1.00	0.57	0.75	0.81	0.67	0.76	0.11	0.67	-0.52	-0.30	-0.14	-0.29	0.67	0.16	0.19	0.42	0.45	0.42	0.05	0.38
sdg5	0.36	0.79	0.70	0.57	1.00	0.80	0.52	0.52	0.68	-0.12	0.72	-0.46	-0.38	-0.13	0.18	0.64	0.28	0.17	0.60	0.63	0.56	0.49	0.18
sdg6	0.60	0.81	0.85	0.75	0.80	1.00	0.74	0.63	0.80	0.03	0.79	-0.54	-0.38	-0.12	0.15	0.76	0.41	0.19	0.61	0.64	0.61	0.34	0.39
sdg7	0.75	0.50	0.83	0.81	0.52	0.74	1.00	0.53	0.70	0.13	0.72	-0.51	-0.27	-0.09	-0.16	0.67	0.33	0.25	0.42	0.44	0.45	0.14	0.47
sdg8	0.51	0.55	0.63	0.67	0.52	0.63	0.53	1.00	0.59	0.30	0.59	-0.20	-0.02	-0.04	0.07	0.65	0.37	0.26	0.33	0.34	0.30	0.13	0.29
sdg9	0.69	0.79	0.89	0.76	0.68	0.80	0.70	0.59	1.00	0.18	0.74	-0.75	-0.58	-0.24	-0.09	0.79	0.09	0.24	0.69	0.77	0.75	0.40	0.44
sdg10	0.42	0.06	0.17	0.11	-0.12	0.03	0.13	0.30	0.18	1.00	-0.02	-0.06	0.09	-0.14	-0.03	0.23	-0.12	0.26	-0.10	-0.07	0.00	-0.00	0.25
sdg11	0.53	0.64	0.85	0.67	0.72	0.79	0.72	0.59	0.74	-0.02	1.00	-0.62	-0.47	-0.14	0.22	0.80	0.45	0.35	0.67	0.72	0.71	0.38	0.34
sdg12	-0.46	-0.43	-0.67	-0.52	-0.46	-0.54	-0.51	-0.20	-0.75	-0.06	-0.62	1.00	0.85	0.15	0.10	-0.62	0.01	-0.35	-0.70	-0.76	-0.86	-0.44	-0.50
sdg13	-0.23	-0.35	-0.50	-0.30	-0.38	-0.38	-0.27	-0.02	-0.58	0.09	-0.47	0.85	1.00	0.10	0.06	-0.48	-0.00	-0.15	-0.81	-0.82	-0.83	-0.40	-0.27
sdg14	-0.15	-0.25	-0.18	-0.14	-0.13	-0.12	-0.09	-0.04	-0.24	-0.14	-0.14	0.15	0.10	1.00	0.23	-0.10	0.16	0.06	-0.07	-0.11	-0.07	0.06	0.09
sdg15	-0.25	0.07	-0.03	-0.29	0.18	0.15	-0.16	0.07	-0.09	-0.03	0.22	0.10	0.06	0.23	1.00	0.16	0.46	0.27	0.08	0.12	0.16	0.39	0.07
sdg16	0.56	0.68	0.85	0.67	0.64	0.76	0.67	0.65	0.79	0.23	0.80	-0.62	-0.48	-0.10	0.16	1.00	0.38	0.37	0.59	0.65	0.69	0.41	0.43
sdg17	0.12	0.12	0.29	0.16	0.28	0.41	0.33	0.37	0.09	-0.12	0.45	0.01	-0.00	0.16	0.46	0.38	1.00	0.20	0.20	0.18	0.20	0.20	0.21
Org%	0.19	0.06	0.28	0.19	0.17	0.19	0.25	0.26	0.24	0.26	0.35	-0.35	-0.15	0.06	0.27	0.37	0.20	1.00	0.11	0.17	0.34	0.42	0.42
Prod	0.34	0.53	0.64	0.42	0.60	0.61	0.42	0.33	0.69	-0.10	0.67	-0.70	-0.81	-0.07	0.08	0.59	0.20	0.11	1.00	0.95	0.81	0.45	0.15
Cons	0.37	0.61	0.70	0.45	0.63	0.64	0.44	0.34	0.77	-0.07	0.72	-0.76	-0.82	-0.11	0.12	0.65	0.18	0.17	0.95	1.00	0.90	0.55	0.23
GDP	0.39	0.49	0.68	0.42	0.56	0.61	0.45	0.30	0.75	0.00	0.71	-0.86	-0.83	-0.07	0.16	0.69	0.20	0.34	0.81	0.90	1.00	0.62	0.54
X	0.09	0.37	0.31	0.05	0.49	0.34	0.14	0.13	0.40	-0.00	0.38	-0.44	-0.40	0.06	0.39	0.41	0.20	0.42	0.45	0.55	0.62	1.00	0.24
Y	0.45	0.14	0.45	0.38	0.18	0.39	0.47	0.29	0.44	0.25	0.34	-0.50	-0.27	0.09	0.07	0.43	0.21	0.42	0.15	0.23	0.54	0.24	1.00

Figure 6. Interrelations of sustainability indicators as normalized covariances (Pearson correlation coefficients, calculated with weighting by population) of data rows over countries in general sustainability and organic agriculture. The table formatted as a “heat map” contains blue colors for negative correlation, reds for positive correlation, and darkness represents strength (for exact correlation values, see the numbers within cells). Labels SDG 1–17 are the respective UN SDG indicators (for details, see text; for meanings, see Figure 4), “Org%” is the share of organic farmland in total agricultural area, “Prod” and “Cons” are production and consumption ecological footprints per capita, GDP is taken at PPP and per capita, “X” represents consumption of organic products (cumulated retail value, see text)/GDP, “Y” represents GDP/consumption footprint (as an attempt to eliminate correlation with simple wealth). Rows and columns containing organic farming data are highlighted by borders and bold numbers. Data compiled from multiple sources (for all the details, see text).

CONCLUSIONS AND OUTLOOK

Organic Agriculture as a Promoter of Sustainability

The observable connection (positive correlation, red in Figure 6) between the presence of organic farming in countries of the World (both production and consumption) and raw indicators of traditional economic

growth (GDP, footprint data) can be regarded as both a disadvantage and an advantage for the chances to promote sustainable societies using organic agriculture as a driving factor. The disadvantage is the explanation present in our earlier micro-level results too [21,22]; the consumeristic viewpoint which sees organic products (organic food) as merely a more healthy and fancy kind of everyday alimentation. This may stand behind the resulting traditional patterns of the organic market, and efficiently impedes the propagation of sustainability principles both within the organic sector, and outside it, e.g., through consumption and agricultural social networks. This can be viewed also as the background of the unsustainable structure (long supply chains, contrary to a common impression and expectation [37]) of international organic food trade.

The real strength is then, however, the presence of organic products as some form of sustainability (with according social patterns) within the consumeristic society (as we have shown it also on the consumers' side [21]). Through this presence, as well as through the widening concept and practices of sustainable farming in the agricultural community [22], an overall network of sustainability can radiate out into the wider society through the production and consumption of organic products. In our present paper, however, we have shown barely more than that the present situation is not completely against this favorable process. Any strong evidence that organic farming on its own is able to promote sustainability in wider circles of economy and society could not be attested.

For strategists and policymakers, the results should suggest that in order to utilize the wider network-building capabilities of organic agriculture, expecting such spontaneous radiating effects is insufficient. Active measures have to be taken to utilize the opportunities in organic farming as a promoter of sustainability in consumption-oriented societies. This active strategy, however, does seem to be possible; there is no strong evidence against its efficiency, either. Organic farming, as another desperately needed tool of infiltrating sustainable concepts into nowadays societies, shall be used, among all the other similar tools, in order to reach the necessary, yet so far elusive goal of global sustainability.

The General Global Sustainability Landscape

As for the general policymaking on sustainability, it cannot be highlighted enough that a coarse first look at the indicators used in the global mainstream approach already gives the insight that environmental and other aspects of sustainability are antagonistic to each other, as well as the environmental aspect is significantly underweighted in the basket of all used instruments. This is reflected by the correlations of SDG indicators (over countrywise data rows) with each other, and with raw indicators of traditional economic growth (GDP, footprint data).

Indicators for SDG's 1–9, 11, and 16 (positively correlated with each other, as well as with GDP and footprint data; red fields in Figure 6) are shown to be in close connection with traditional wealth. Thus, societal and

economic sustainable development goals (on poverty, hunger, health, education, gender equality, sanitation, energy, employment, industries, cities, rule of law) become coherent parts of an attractive picture of XXth-century-style welfare for the developing World today. Opposed to this vast majority, there is a small subset of SDG indicators, namely SDG's 12 and 13, which show antagonism (negative correlation, blue fields in Figure 6) to the former majority, and these represent environmental goals. These two can be regarded as strictly critical to the traditional (XXth-century-style) concept of wellbeing. The groups and their relative weights are clear.

By weaker correlations, SDG's 10 and 17 about social justice are associated with the traditional welfare side, while SDG's 14 and 15 about conservation of our supporting ecosystems come to the environmental side; possibly (?) forming the core of a systematic coherent unification of different aspects of sustainability.

This is the point where we have to take the opportunity to draw a parallel between our coarse-scale, first-look study as an exclamation mark, and the most sophisticated research on sustainability indicators and fundamentals of policymaking on sustainability. One of the best compilations in this regard [38] shows that compound business sustainability indices (the Dow Jones Sustainability Index there) as cumulative indicators of environmental, societal and economic sustainability have a considerable bias *against* environmental sustainability too. Furthermore (partly as a consequence), the chief argument for the possibility of becoming more sustainable is the vast distance that we are from it yet. In the cited study, for example, the mainstream sustainability indicator (still, the DJSI) is able to align with environmental sustainability (there, the CO₂ content of the atmosphere) in only anomalous circumstances (there, the coronavirus pandemic), otherwise there is a negative correlation between them.

Given that the vital part of near future's policymaking is based on today's indicators [39], it is not enough to see how difficult the very essence of sustainability is to implement: a radical change in everyday practices of lives of people, industrial processes, political directions, etc. We have to turn our attention to the very basics of the mainstream methodology too. Even if we managed to reach our short-term goals of sustainability as per the currently established indicators, we would certainly not do enough for environmental sustainability (moreover, there is a big chance of working against it), the most urgent and objective part of sustainability.

This calls upon seeking harmony between environmental and other aspects of sustainability on the conceptual level [40,41]; a feature which mainstream economics and philosophy still lacks.

DATA AVAILABILITY

The dataset of the study is available from the authors upon reasonable request. All the primary data, however, is from open-access databases [25–32].

AUTHOR CONTRIBUTIONS

Both authors have contributed to the manuscript at an equal amount. All authors have read and agreed to the published version of the manuscript.

CONFLICTS OF INTEREST

The authors declare that there is no conflicts of interest.

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