POTSDAM INSTITUTE FOR CLIMATE IMPACT RESEARCH

Sustainable Development Goals: *old wine in new skins?*

Discovering and quantifying interactions within and across SDGs

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What are SDGs?

Document: *"Transforming our world: the 2030 Agenda for Sustainable Development"* (UN 2015)

Intergovernmental defined set of 17 goals and 169 constituent targets

Major Problems:

- Politically defined targets
- less underpinning with data/indicators
- Process knowledge is vague (only qualitatively described)

Question: Must/can science fill knowledge gaps and how?

SDGs – opinions & state of play

- **1% GWP (some 800bn US$) p.a. are needed for fulfillment of SDGs until 2030**
- **Multitude of sector studies……! SDG *X* cannot be achieved, if *Y* is not fulfilled**

Lempert (2017): ...renaming of the MDGs as SDGs may be little more than a marketing strategy and that the goals themselves may simply be a fundraising document for […] stakeholders rather than any kind of action plan for the benefits of humanity. *Consilience: J.Sustainable Develop.*

Allen et al. (2017): An Iterative Framework for National Scenario Modelling for the Sustainable Development Goals (SDGs). *Sust. Develop.*

Bowen et al. (2017): Three key governance challenges—collective action, trade-offs, and accountability, *Opinion in Env. Sust.*

Steenberg et al. (2017): Between 274 and 371bn US$ p.a. to make progress towards SDG targets in 67 developing countries. *Lancet*

Several authors (2017): Green Climate for or Global Health funds as blueprint for achieving SDGs, *various sources*

First take home message

There is now common framework which tries to analyse whether a SDG sector action would create synergies or trade-off in respect to other SDGs

Qualitative ranking approach

Problems identified:

- Incoherent policies
- Outdated/wrong preconceptions
- Geographical, economic, technology context matter
- Time scale matters

GOALS SCORING

The influence of one Sustainable Development Goal or target on another can be summarized with this simple scale.

Interaction	Name	Explanation	Example
+3	Indivisible	Inextricably linked to the achievement of another goal.	Ending all forms of discrimination against women and girls is indivisible from ensuring women's full and effective participation and equal opportunities for leadership.
+2	Reinforcing	Aids the achievement of another goal.	Providing access to electricity reinforces water-pumping and irrigation systems. Strengthening the capacity to adapt to climate-related hazards reduces losses caused by disasters.
+1	Enabling	Creates conditions that further another goal.	Providing electricity access in rural homes enables education, because it makes it possible to do homework at night with electric lighting.
0	Consistent	No significant positive or negative interactions.	Ensuring education for all does not interact significantly with infrastructure development or conservation of ocean ecosystems.
–1	Constraining	Limits options on another goal.	Improved water efficiency can constrain agricultural irrigation. Reducing climate change can constrain the options for energy access.
–2	Counteracting	Clashes with another goal.	Boosting consumption for growth can counteract waste reduction and climate mitigation.
–3	Cancelling	Makes it impossible to reach another goal.	Fully ensuring public transparency and democratic accountability cannot be combined with national-security goals. Full protection of natural reserves excludes public access for recreation.

(Nilsson et al. 2016 Nature)

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Land resource – Food price nexus

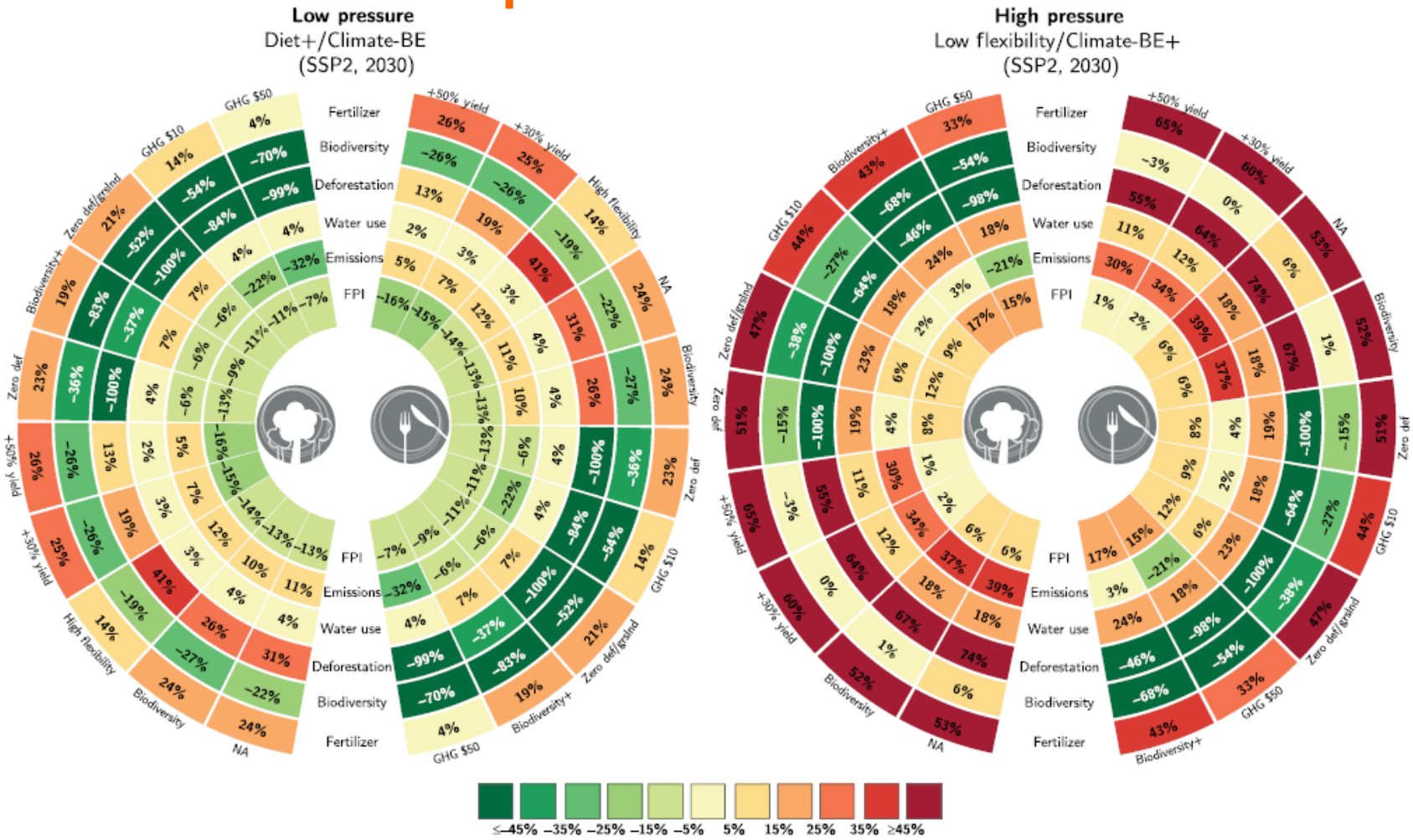


Fig. 4. Circular plots illustrating the projected consequences of low- and high-pressure SDG strategies. Strategy outcomes are measured by five environmental indicators—LULUCF carbon emissions, agricultural water use, deforestation, biodiversity loss, and fertilizer use—and a global food price index (FPI). Policies on the outer ring of each circle indicate the third policy in each strategy. In the **left** (**right**) hemisphere of each circle, strategies are ranked from top to bottom by EI score (food price). Colors and percentages in each cell indicate the deviation for each indicator in year 2030 of the simulation relative to 2010.

(Obersteiner et al. 2016 Science Advances)

Pure data driven approach:

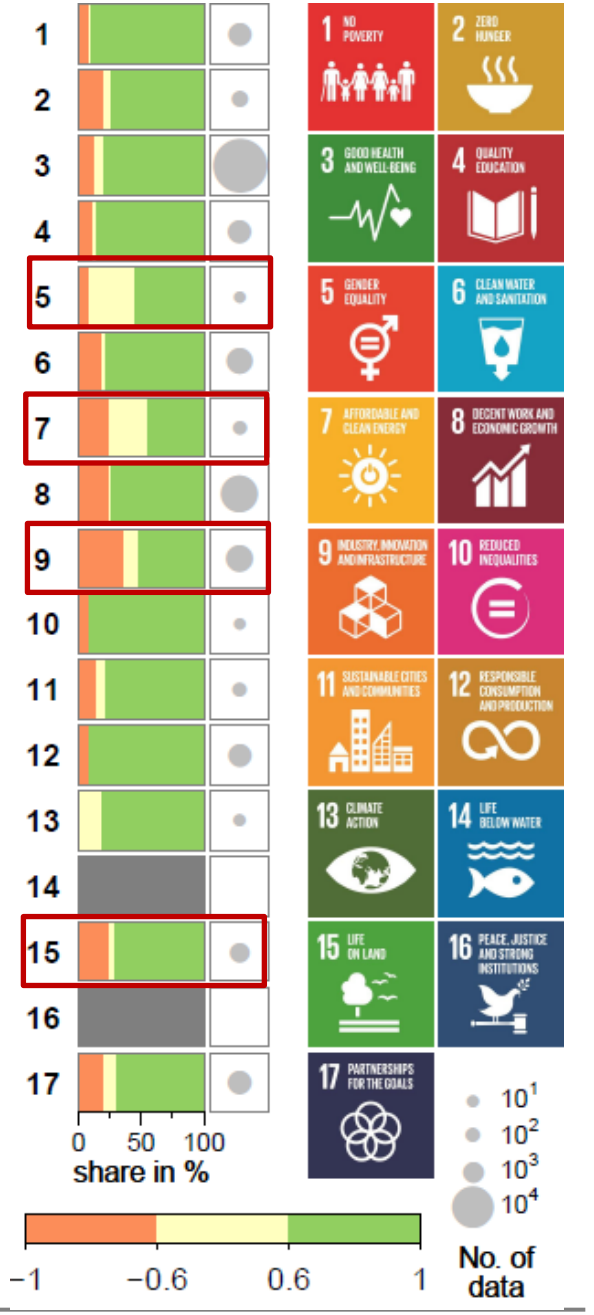
- **UN Statistics Division — Global SDG Indicators Database 2016 (https://unstats.un.org/sdgs/indicators/database/)**
- **Data available for 122 indicators (~ 50% of the official SDG indicators), 227 countries, and 1983—2016 period**
- **More than 80 time-series data are accessible for 85% of the countries.**

- **Synergies and trade-offs are statistically defined.**
- **Spearman's ρ value greater than 0.6 is indicates synergy while a ρ less than -0.6 shows a trade-off.**
- **Indicator pairs with ρ values between -0.6 and 0.6 are not classified.**
- **When p value is less than 0.05, the correlation is considered statistically significant.**

Problematic insofar as statistics does not explain mechanisms

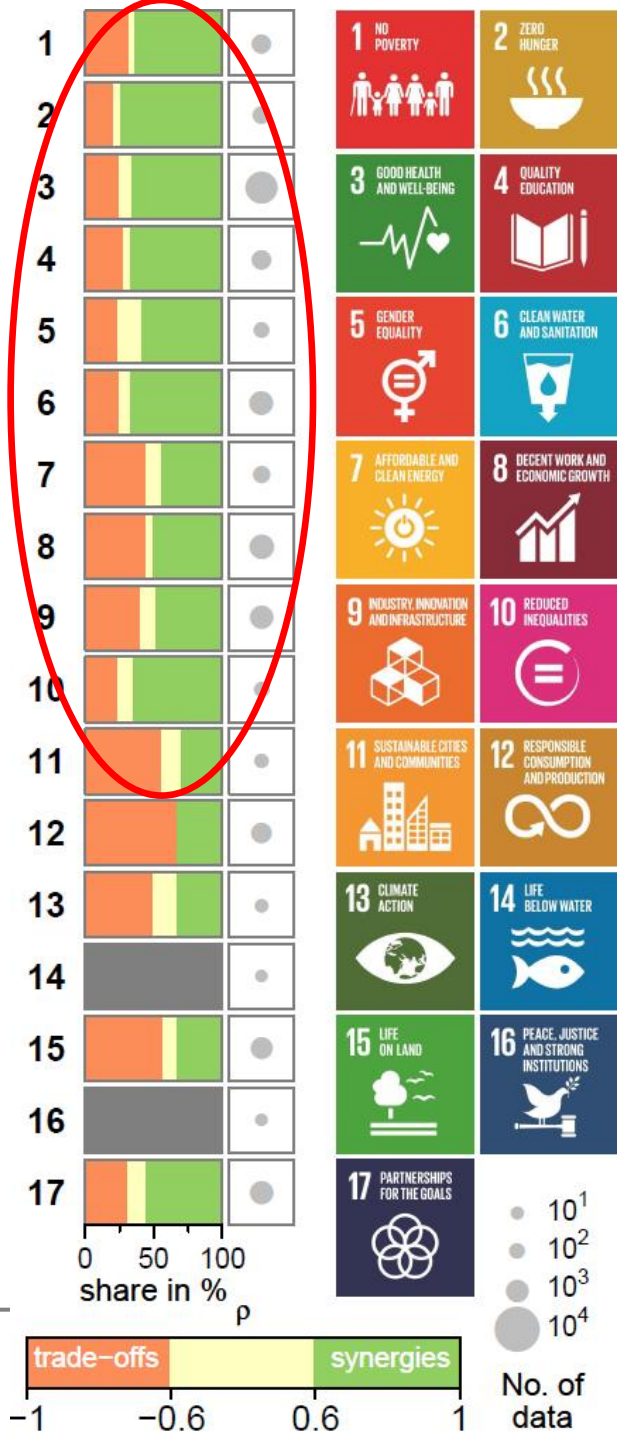
Results (interactions within a goal)

- **Within each goal, synergies largely outweigh the tradeoffs.**
  - **i.e., progress in one indicator moves parallel with the development of other indicators.**
- **More than 20% of the cases show trade-offs within some SDGs (e.g. SDG 9: *Industry Innovation & Infrastructure*, SDG 15: *Life on Land*).**
  - **i.e., progress in one indicator may reverse fulfillment of other indicators.**
- **For, e.g. SDGs 5 *(Gender Equality)* & 7 (*Affordable & Clean Energy* and *Peace)* in 20% of the case no tradeoffs or synergies could be observed.**
  - **i.e., progress in one indicator may be independent from the development of other indictors.**



Results (particular cases – SDG2)

SDG 1 (*No Poverty*) is linked with synergies across most SDGs.



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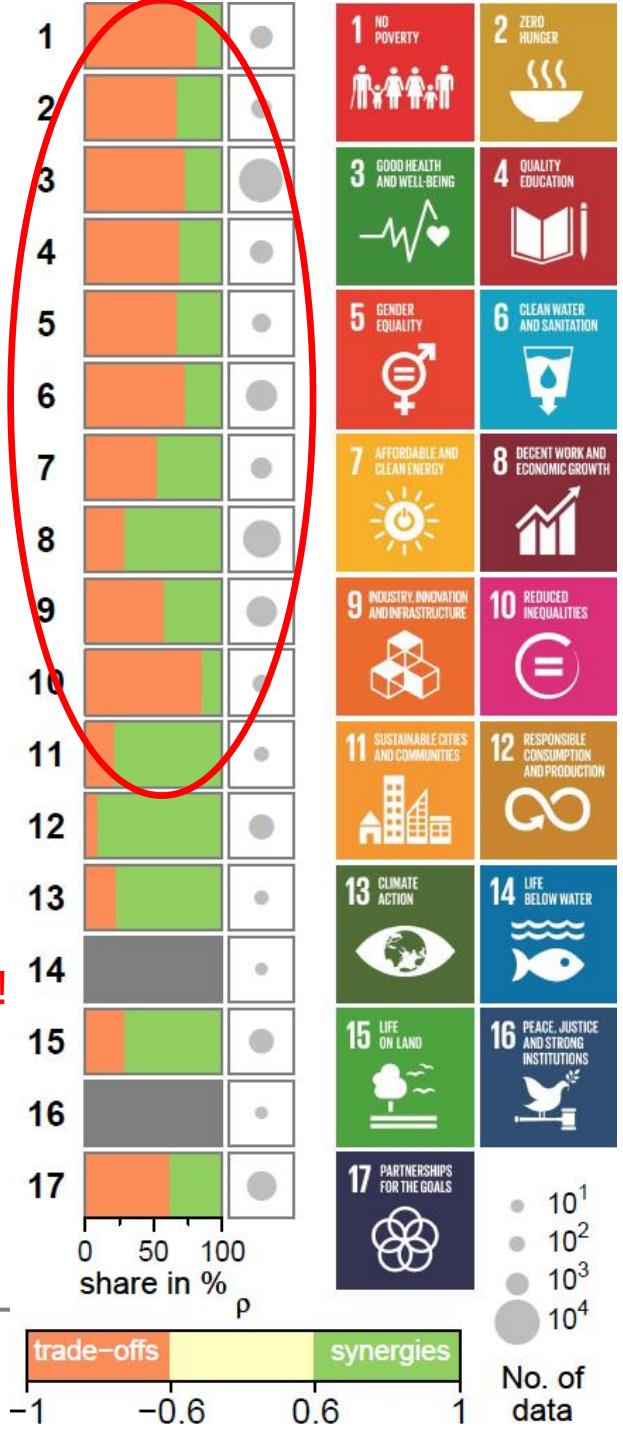
Prajal/Costa/Rybski/Lucht/Kropp (2017): Earth's Future, in press.

Results (particular cases – SDG12)

SDG 12 (*Responsible Consumption & Production)* is usually linked with trade-offs across SDGs.

Root cause of global environmental and climate change!



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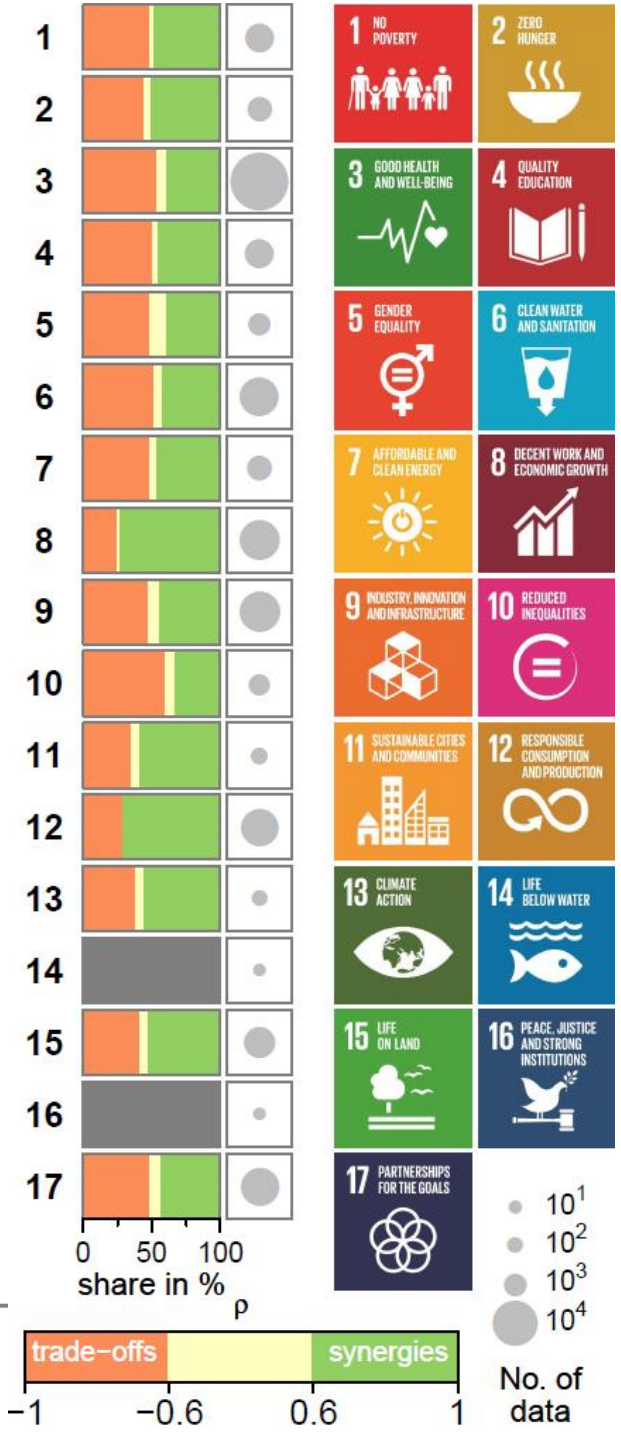
Prajal/Costa/Rybski/Lucht/Kropp (2017): Earth's Future, in press.

Results (particular cases – SDG8)

Mix interactions are observed for SDG 8 (*Decent Work & Economic Growth*)



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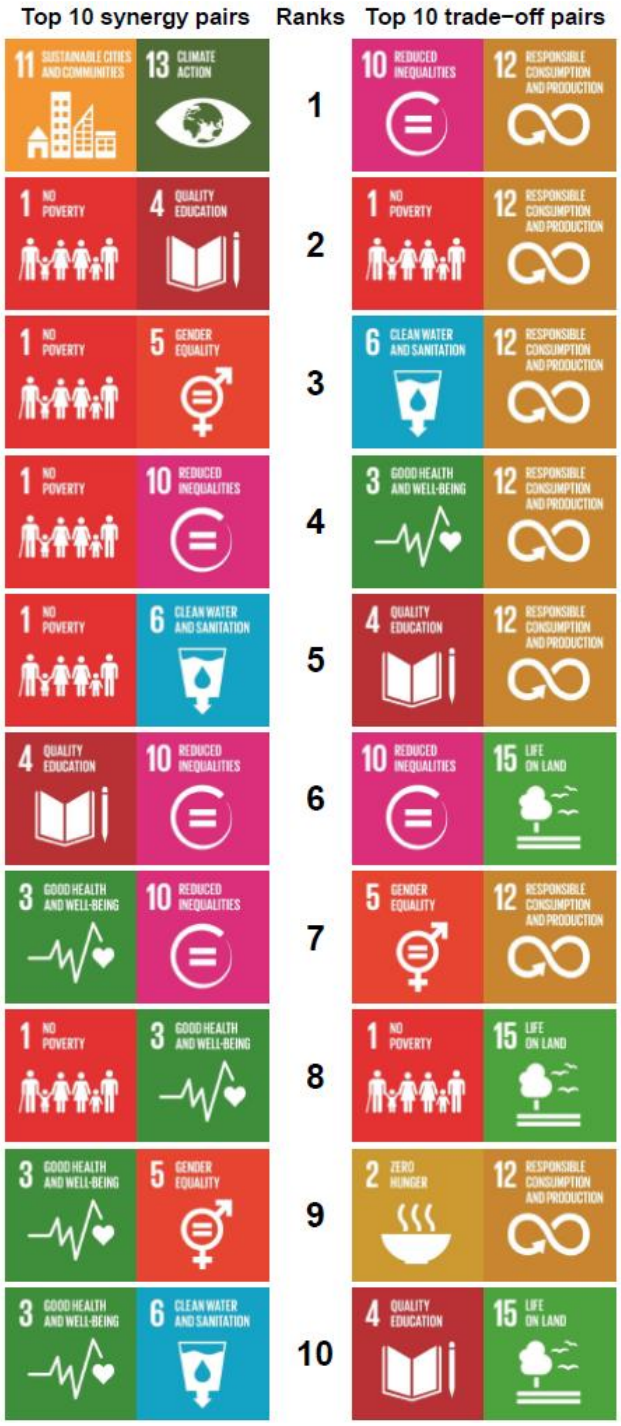
Global ranking of SDG interactions

- **SDG 1 (*No poverty*) and SDG 3 (*Good health and well-being*) appear most frequently in the in the global top ten trade-off pairs.**

- **SDGs 12 (*Responsible consumption & production*) and 15 (*Life on land*) frequently appear in the global top ten trade-off pairs.**



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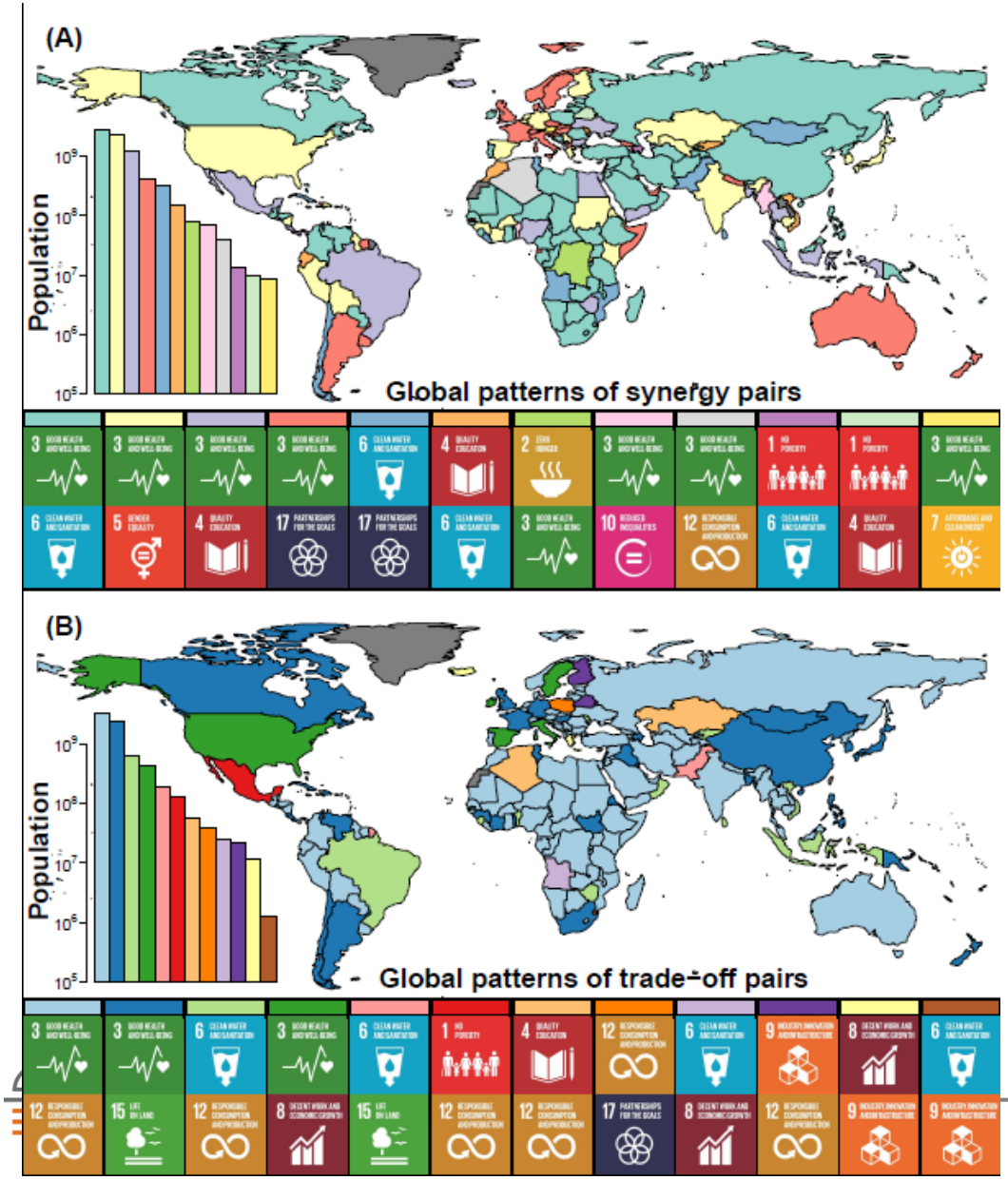
Country patterns of SDG interactions



- **Synergies between SDG 3 (*Good health and well-being)* and 6 *(Clean water and sanitation)* are widely observed among the countries (total population approx. 2.7bn).**
- **Trade-offs are being observed for SDG 3 (*Good health and well-being)* and 12 *(Responsible consumption and production)* for a total population of 3.4bn.**

Prajal/Costa/Rybski/Lucht/Kropp (2017): Earth's Future, in press.

Second take home messages

- **Statistical approach can highlight synergies and trade-offs, but a deterministic approach is of urgent need (at least on a reduced form level, otherwise misconceptions and/or money wasting could be the consequence)**

- **For SDG achievements strategy development is needed on certain levels, transfer/learning of/from existing concepts may help, but will be not sufficient!**

- **Coherent international research agenda is needed**

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Thank you very much for your attention!

Questions?