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## **Subject strapline:** SUSTAINABLE DEVELOPMENT

**Title:** Antagonists to meet the 2030 Agenda

### **Standfirst:**

Sustainable Development Goals (SDGs) influence each other positively or negatively. Currently, climate change, inequalities, and irresponsible consumption and production are key antagonists to meet the UN's 2030 Agenda.

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In 2015, the United Nations adopted the 2030 Agenda for Sustainable Development, consisting of 17 goals and 169 targets ranging from human well-being over economic prosperity to environmental protection. Under the current development paradigm that heavily focuses on economic growth, goals or targets have positive or negative influences on others<sup>1</sup>. Whilst positive associations between goals or targets facilitate achievement of the 2030 Agenda, negative associations may hinder the progress<sup>2</sup>. Meeting SDGs relies on deeper understanding of underlying processes. However, it is a challenge to disentangle synergies and trade-offs out of the complex network of SDG interactions. Now, writing in *Nature Sustainability*, David Lusseau and Francesca Mancini report for the first time how key synergies and trade-offs vary by country income<sup>3</sup>.

Preceding the 2030 Agenda, eight Millennium Development Goals provided the international development framework to fight poverty in multiple forms. During this period (2000-2015), rich countries supported poor ones to implement and meet the goals resulting in saved lives and improved living conditions<sup>4</sup>. Looking forward, succeeding SDGs aim to tackle complex and multi-dimensional challenges faced by humankind beyond economic, i.e., including social and environmental sustainability. The 2030 Agenda also aims for “universality” –applied in all countries– and to “leave no one behind” –reaching marginal groups first. So far several interactions among economic, social, and environmental dimensions have conflicting outcomes, e.g., an increase in carbon emissions with economic growth<sup>5,6</sup>.

For monitoring progress towards SDGs indicator frameworks consisting of more than hundred indicators have been developed. The authors analyse the indicator framework provided by the World Bank to understand SDG interactions statistically. Negative associations between indicator pairs suggest undesirable co-evolution while positive ones are favourable for meeting SDGs. The authors estimate the association of each goal or target pairs by correlating indicator pairs and grouping them according to membership of goals or targets. By analysing complex networks of interactions between goals and

targets for the first time, this article<sup>3</sup> identifies key synergies and trade-offs, as well as the relative contribution of each goal and target to the overall 2030 Agenda.

On the global scale, Lusseau and Mancini<sup>3</sup> highlight that SDG 10 (*Reduce Inequalities*), SDG 12 (*Responsible Consumption and Production*) and SDG 13 (*Climate Action*) are most central and interact negatively with many other SDGs. In the present global setting, progress towards the other goals will move these SDGs away from the desired direction towards sustainability. However, these interactions can vary by country incomes. The replicated analysis for the four income group (low, lower middle, upper middle, and high) shows mostly positive associations among SDGs in low-income countries where all the 17 goals can progress with minimum trade-offs. However, SDG 12 and SDG 13 are antagonistic in high-income countries, which will hinder achievement of the other goals under business as usual.

This study<sup>3</sup> also presents leverages that have positive compound effects on other goals or targets. Actions to reduce inequalities in high-income countries will synergise progress in the other goals although reducing inequalities (SDG10) appears antagonistic on the global scale. This can be linked to Kuznets curve behaviour that depicts reduced inequality with economic growth<sup>7</sup>. In low-income countries, SDG 1 (*No Poverty*) needs to be a key priority because all the goals will be disproportionately affected by measures taken to eliminate poverty. Small progress in these goals can tremendously contribute to the 2030 Agenda. On the target level, the study identifies that reducing child mortality (Target 3.2) has the most synergistic effect for all countries regardless of their income.

The novel findings from Lusseau and Mancini<sup>3</sup> emphasize variation on key SDG interactions across country income. This implies a need for differentiated policy priorities among countries toward the 2030 Agenda. Comparing the networks of target and goal interactions, they additionally highlight that the most influencing goals may not necessarily come from the most influencing targets. This is because the targets within a goal can have positive or negative interactions with each other<sup>2</sup>. Therefore, when the priorities for broader governance can be identified by the goal interactions, potential interventions need to be figured out based on the target interactions.

Meeting SDGs relies on holistic approaches that can tackle trade-offs and leverage synergies. This study, depicting complex interlinkages among SDGs and their targets, is a timely call for breaking away disciplinary silos for sustainability, although some open questions still remain. Upcoming studies need to disentangle mechanisms behind the interactions, their direction and causality. New strategies are needed to overcome conflicts and provide solutions and pathways for attaining SDGs. Filling the data gap on SDG indicators and integrating multiple indicator frameworks will further support evidence-based policy making.

Wrapping up, Lusseau and Mancini<sup>3</sup> highlight that the 2030 Agenda is much more than just a collection of goals, targets, and indicators. Instead, SDGs are a system of

interacting components. Under business as usual, these interactions show both synergies and trade-offs. For successful implementation, SDGs need to be transformed into a system of synergistic re-enforcement, making the trade-offs non-obstructive. Failing to achieve one goal or target can make the system unstable and lead to failure of the 2030 Agenda. By breaking away current trends, urgent actions for limiting climate change, increasing equalities, and transforming towards sustainable consumption and production will positively affect the whole SDG system.

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**Figure legend:**

Preparation for irrigation in Yara Village (ca. 3500 M), Upper Mustang. The farmers in the village are cautious before irrigating their fields. Glaciers retreat due to climate change has created water shortage in the region. Farmers are carefully using the available water for meeting their competing water demands. This illustrates the complex interactions among SDG 2 (*Zero Hunger*), SDG 6 (*Clean water and Sanitation*), SDG 13 (*Climate Action*) and SDG 15 (*Life on Land*) in Hindu-Kush Himalayan region.

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