

Closing a modest investment gap will put hunger, climate and water action back on track to meet global goals



Photo: Felix Clay

CoSAI and FCDO jointly commissioned a **gap study** to determine how far away innovation investment is from helping agri-food systems achieve zero hunger goals and the Paris Agreement while reducing impacts on water resources in the Global South. The results show that the world can come much closer with some well-placed investments.

Actions needed

- **Investors should put a further US\$4 bn a year into national and international R&D, private R&D, and higher research efficiency** to approach zero hunger in the Global South by 2030.
- **National and international investors should deploy US\$6.5 bn a year for climate-smart technical mitigation options in farming** to reduce and sequester emissions on a path to less than 2°C of global warming.
- **Investors should improve water resource management with US\$4.7 bn a year** for innovation to rein in agricultural blue water use by 10% in 2030.
- **The international community should get SDG2, SDG6, SDG13 and the Paris Agreement back on track** by closing this investment gap of US\$15.2 bn for agricultural innovation – modest in light of the US\$700 bn spent every year on agricultural subsidies.
- **Public and private investors should make complementary investments** in finance, agricultural extension and infrastructure, which are also critical to meet the global goals.

The challenge: Agri-food systems in the Global South need to transform by 2030

It is clear the world is not on track to meet the ambitions of the 2030 Agenda for Sustainable Development and the Paris Climate Agreement – especially after the global disruptions of COVID-19. If we are to achieve the Sustainable Development Goals (SDGs), succeed in stabilizing global warming at well below 2°C, and adapt to the climate change this will bring, agri-food systems are going to have to transform by 2030. They must meet increasing demand for affordable and nutritious food. They must do so as global warming makes it harder to grow food in many areas. And they must do so using less water, less land and fewer inputs, if we are to reverse deforestation and reduce emissions – critical to stabilizing the climate and halting the global collapse in biodiversity.

Some earlier estimates have suggested that the unmet costs to meet the goals will be very high. The cost of ending hunger has been calculated at an additional **US\$39-50 bn**, **US\$52 bn** or **US\$265 bn** per year, while the cost of adapting to climate change through research and development (R&D) has been estimated at **US\$20-200 bn** per year.

Focus on the high-impact paths to innovation

CoSAI and the **Transforming Agricultural Innovation for People, Nature and Climate** campaign have jointly commissioned a **gap study** that takes a different approach from earlier estimations. It focuses on modelling a set of research and innovation investments that are expected to have an exceptionally high return in meeting the goals.

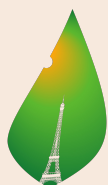
The modelled scenarios consider increasing investments in international and national public R&D, private R&D, and higher research efficiency, as well as water infrastructure modernization, and finance to enable the uptake of innovations to support hunger, climate and water objectives.

A comparison with **earlier work using the same model** indicates that shifting additional spending to agricultural R&D may be more cost effective in addressing hunger than large increases in infrastructure investment.

Objectives used for the gap analysis model



- Ensure less than 5% of the world's population go hungry by 2030.



- Reduce and sequester emissions in agriculture, and stop emissions from land use change for food production, on a trajectory consistent with stabilizing global warming at less than 2°C above pre-industrial levels.
- Support adaptation of the agricultural system to a changing climate.



- Limit agricultural water use.
- Limit pollution due to nitrogen and phosphorus loading.

Invest US\$4 bn more per year on the path to zero hunger

An additional US\$4 bn each year on R&D, channeled through international public research institutions, national agricultural research and extension systems in the Global South, and the private sector, could see, by 2030:

- The risk of hunger fall below 5% in East Asia, South Asia, Latin America and the Caribbean – in line with the **FAO threshold** for achieving SDG2.1.
- The risk of hunger fall to 11.8% in sub-Saharan Africa. While this is a strong reduction, it suggests that further investment, for instance in social protection, would be required to reduce the risk of hunger below 5% here.
- Greenhouse gas emissions fall by 342 megatons CO₂ equivalent relative to the business-as-usual scenario – but additional investments would be required to achieve emissions trajectories consistent with the Paris Agreement.

Improving research and innovation efficiency is critical for making every dollar of investment count. In many cases, efficiency investments nearly double the improvements to modelled productivity. While improving efficiency is often pictured as inventing cheaper and quicker laboratory

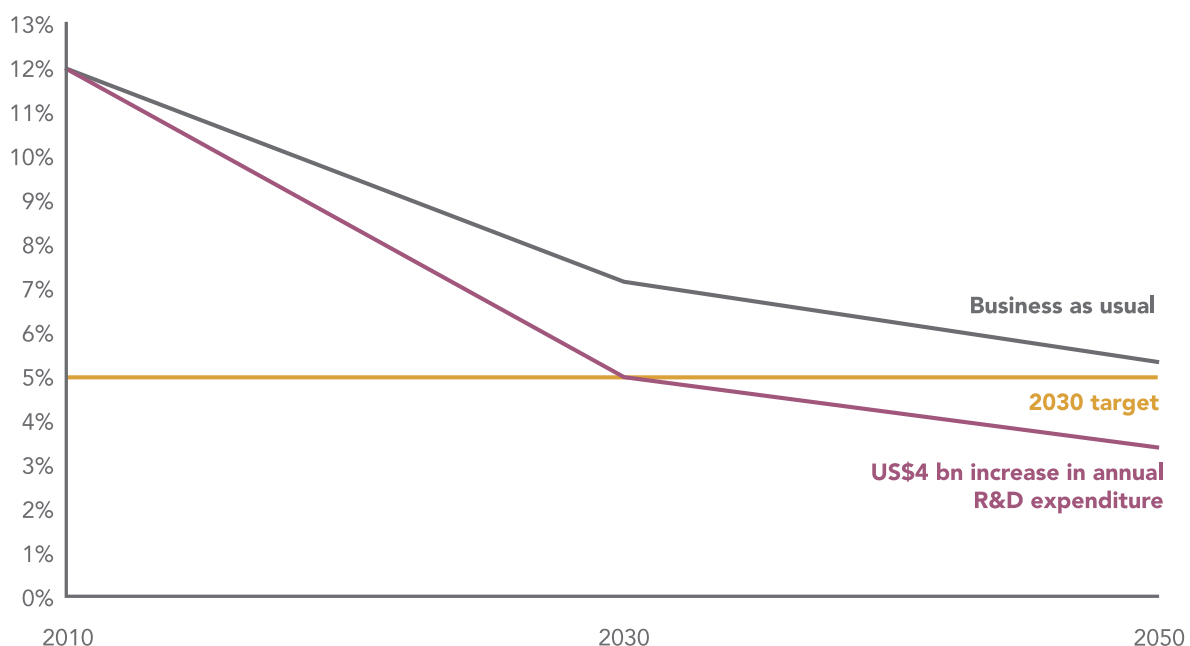
methods, it can also be about finding efficient ways to work with users in developing and taking up innovations, and in creating a supportive policy and institutional environment for this. Another CoSAI commissioned study reviews experiences with **approaches and instruments for innovation**, including platforms, networks, funding mechanisms, incubators and accelerators.

Invest US\$6.5 bn more per year to mitigate climate change and US\$4.7 bn to secure water

According to **the study**, when combined with the US\$4 bn for research and development described above, a further US\$6.5 bn invested each year to 2030 – rising to US\$8.4 bn each year by 2050 – to subsidize the uptake and deployment at scale of innovations for reducing greenhouse gas emissions would deliver a mitigation trajectory in line with the Paris Agreement, for both CO₂ and non-CO₂ emissions.

A further US\$4.7 bn invested each year on improvements to water resource technology and management, when combined with the above US\$4 bn for research and development, could reduce agricultural water use in 2030 by 10% and lead to 21% less agricultural

Proportion of world population at risk of hunger



nitrogen pollution and 14% less phosphorous pollution than business as usual. This is 1.3 times greater than the expenditure on water resource technology and management under business as usual.

However, the modelling exercise did not find scenarios that are able to halt land use change. Although deforestation caused by agriculture is reduced by innovation investments, significant expansion in land for agricultural use will still occur over the coming years.

Unlock US\$1.7 trillion a year in economic benefits for the Global South

The **CoSAI study** finds that the investment of an additional US\$4 bn each year on R&D would also yield strong economic benefits, increasing annual economic activity in countries in the Global South by US\$1.7 trillion each year by 2030. This is a very high economic return on investment, but in line with other recent studies.

This investment is projected to increase productivity 6-17% in crops and 8-23% in livestock, depending on the region. It would lead to reduced food prices, benefiting the poorest rural and urban consumers, with projected price drops in staple foods of the order of 25% by 2030 and 40% by 2050. It would also reduce the need for food imports, which in the absence of investment is projected to increase substantially.

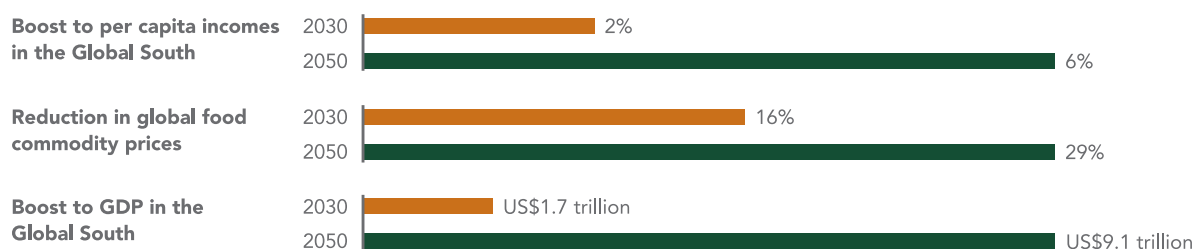
Conclusions

Between now and 2030, an additional US\$4 bn per year for R&D and US\$6.5 bn for uptake of climate-smart technical options would deliver very significant progress against the SDG 2 hunger target and climate trajectories. Meanwhile, US\$4.7 billion a year in water technology and management would propel progress on SDG 6.

An uplift in finance could come from reorienting current research and innovation spending to promote environmental, climate change, inclusivity and nutrition outcomes. **Another recent study commissioned by CoSAI** identified that less than 7% of current funding for agricultural innovation for the Global South explicitly aims to improve environmental and climate outcomes. And only around half of this also addresses social or nutrition outcomes.

Research and innovation spending must also be accompanied by supportive policies and additional investments in value chains, finance, extension and other enabling factors. A complementary study found that investment in **agricultural extension and access to finance** to bring up the level of all countries to that of best-performing countries in the Global South would reduce the risk of hunger and income poverty by about a third relative to innovation alone.

Economic benefits of an additional US\$4 bn in R&D



For more information, see the full report at: <https://hdl.handle.net/10568/114761>