the last word:

Let the **environment guide** our development

To close this edition of *International Innovation*, we revisit the impassioned TED talk given by sustainability expert **Professor Johan Rockstrom**, who discussed the capacity to use change and crisis to inspire innovative thinking and a new approach to sustainability

WE LIVE ON a human-dominated planet, putting unprecedented pressure on the Earth's systems. We're the first generation to be informed that we may be undermining the stability and ability of the planet to support human development as we know it. Because the planetary risks we're facing are so large, business as usual is not an option. In fact, we're in a phase where transformative change is necessary, opening the window for innovation, new ideas and paradigms. This is a scientific journey on the challenges facing humanity in the global phase of sustainability.

The trouble is, we're putting a quadruple squeeze on this poor planet, from population growth, the climate agenda and ecosystem decline. The fourth pressure is surprise – the notion and the evidence that we need to abandon our old paradigm that ecosystems behave linearly, predictably and controllably. These systems tip over very rapidly, abruptly and often irreversibly. We may have entered a new geological era – the Anthropocene, where humans are the predominant driver of change at a planetary level.

Now, as a scientist, what's the evidence for this? If you take virtually any parameter that matters for human wellbeing, they all show the same pattern over the past 200 years – an imprint on the global level. We may have entered the most challenging and exciting decade in the history of humanity on the planet, the decade when we have to bend the curves.

We recognise the fact that systems have multiple stable states separated by thresholds. A system may gradually lose resilience under pressure of climate change, erosion and biodiversity loss, then suddenly tip over a threshold, changing state and ending up in an undesired situation where new biophysical logic takes over, new species take over and the system gets locked.

If exposed to a trigger, the system may tip over, losing its resilience and leaving undesired systems that cannot support economic and social development. The Arctic appeared to be in a good state as a regulating biome; no scientist could predict that in 2007 we could be crossing a threshold. The largest red flag warning for humanity is that we are in a precarious situation.

Are we in fact putting ourselves in a situation where we're coming too close to thresholds that could lead to deleterious and undesired change for human development? Our old paradigm of analysing, pushing and predicting parameters into the future, aimed at minimalising environmental impacts, is of the past.

There is ample science to indicate that we have the ability to now move into a new innovative, transformative gear, but to do this, 200 countries on this planet have to simultaneously start moving in the same direction. This fundamentally changes our governance and management paradigm from the current linear, command and control thinking, towards a much more flexible and adaptive approach. We have to invest in persistence, and in the ability of social systems and ecological systems to withstand shocks. We have to invest in transformation's capability, moving from crisis into innovation and the ability to rise after a crisis, and of course to adapt to unavoidable change. This is a new paradigm. We're not doing that at any scale on governance.

Do we have any examples of success on this mind shift being applied at the local level? Well, yes, in fact we do, and the list can start becoming longer and longer: for example, Latin America, where plough-based farming systems of the 1950s and 60s brought farming to a dead-end. Innovation and entrepreneurship among farmers in partnership with scientists started an agricultural revolution of zero tillage systems combined with locally adapted technologies, which not only produces more food, but also sequesters carbon.

The future challenge is feeding a world of 9 billion people. We need a new green revolution, and agriculture must change from a source of greenhouse gases to a sink. We cannot expand anymore because it erodes the planetary boundaries. We need a transformation. Interestingly we've shown that even in the most vulnerable small-scale rainfall farming systems, with innovations and supplementary irrigation to bridge dry spells and droughts we can triple or quadruple yield levels on current land.

We can list many examples of transformative opportunities around the planet. The key though in all of these is the shift in mindset, moving away from a situation where we simply are pushing ourselves into a dark future. Incremental change is not an option.

Science indicates that we can achieve a prosperous future within a safe operating space if we move simultaneously, collaborating from local to global scale in transformative options which build resilience on a finite planet.

The above excerpts are abridged highlights adapted from Rockstrom's TED talk in August 2010. To view the presentation in full, visit: www.ted.com/talks/johan_rockstrom_let_the_environment_guide_our_development