International Resource Panel

MANAGING AND CONSERVING THE NATURAL RESOURCE BASE FOR SUSTAINED ECONOMIC AND SOCIAL DEVELOPMENT

A reflection from the International Resource Panel on the establishment of Sustainable Development Goals aimed at decoupling economic growth from escalating resource use and environmental degradation

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About the International Resource Panel (IRP)

The UNEP-hosted International Resource Panel (IRP) was established in 2007 to provide independent, coherent, authoritative and policy relevant scientific assessments on the use of natural resources and its environmental impacts over the full life cycle and to contribute to a better understanding of how to decouple economic growth from escalating resource use and environmental degradation. The Panel is constituted of eminent experts from all parts of the world, bringing their multidisciplinary expertise to address resource management issues. Benefitting also from the support of a large number of governments and other stakeholders, who serve as members of the Steering Committee, the IRP provides a platform for exchange between policy-makers and scientists so that policies for sustainable development can be formulated taking into account the best available science on sustainable management of natural resources and conservation of the natural resource base of economic and social development. The assessments of the IRP to date demonstrate numerous opportunities for governments and businesses to work together at the science-policy interface to create and implement policies to encourage sustainable resource management, including through better planning, more investment, technological innovation and strategic incentives

About the Report

Given the IRP's mission and responsibility for raising the visibility and sense of urgency regarding efficient and effective utilization of natural resources and related concerns among decision-makers and the public, this report advocates and promotes the embedding of the rational management of the natural resource base of economic and social development throughout the Post-2015 development agenda and the process for the establishment of Sustainable Development Goals (SDGs) initiated in Rio+20. In addition to the integration of resource management concerns, as recommended by several well researched submissions, in goals being proposed on ***energy, food***, ***water***, and ***sustainable urban development***, this paper also advocates the adoption of a separate SDG on sustainable resource management to focus on the need for efficient use of natural resources in an equitable and environmentally benign manner aimed at decoupling economic growth rates from escalating resource use and environmental degradation. Examples of possible targets are also provided in this paper to illustrate the kind of measurements required and provide an outline of the trajectory to be adopted. The quantum and timeframe of the targets is debateable and should be the outcome of a political process.

Sustainable Resource Management – *an imperative for human well-being*

Over the last decades, the world has witnessed phenomenal economic growth with the dissemination of new innovative technologies, the accelerated globalization of the economy and the adoption by governments of rational policies. As a result, hundreds of millions of people have been lifted out of absolute poverty, many of them enjoying unparalleled levels of health, personal fulfilment and human dignity.

As nations strive to improve economic welfare, a large part of the costs of these efforts are being passed on to the environment and future generations. Unsustainable production and consumption patterns of land-based products are exerting unprecedented pressure on land resources across the globe[1]. About a quarter of the earth's land area is highly degraded (up from 15% in 1991)[2] and 5.2 million hectares of forests are lost every year[3]. Rivers and lakes are drying up, groundwater aquifers are getting depleted, oceans are becoming acidified, and more than 30% of global fisheries that are harvested are overfished[4]. 27% of the world's 845 species of reef-building corals have been listed as threatened and an additional 20% are considered near threatened[5]. Species and other forms of biodiversity are vanishing at rates not seen since the last mass extinction 65 million years ago when the dinosaurs disappeared[6].

Greenhouse gas emissions increased by more than 30% between 1990 and 2010 and are leading to substantial changes in the environment[7]. The production of conventional fossil fuels has peaked[8] and the environmental implications of the new, unconventional sources are likely to lead to severe limits on their extraction.

[1] UNEP (2014) Assessing Global Land Use: Balancing Consumption with Sustainable Supply. A Report of the Working Group on Land and Soils of the International Resource Panel. Bringezu S., Schütz H., Pengue W., O´Brien M., Garcia F., Sims R., Howarth R., Kauppi L., Swilling M., and Herrick J.
[2] UNCCD secretariat (2013) A Stronger UNCCD for a Land-Degradation Neutral World
[3] FAOSTAT (2013)
[4] FAO (2012) The State of the World Fisheries and Aquaculture
[5] 2008 IUCN Red List of Threatened Species™
[6] 65 million years ago, our planet faced the largest mass extinction of land animals in its history when approximately 700 dinosaur species were wiped off the face of the earth. In recent years, we have come to face a different, yet equally horrific calamity as species around the world have begun, and continue to decline at an alarming rate. This represents the sixth mass species extinction. (IUCN website)
[7] FT 2010, European Commission, Joint Research Centre (JRC)/PBL Netherlands Environmental Assessment Agency. Emission Database for Global Atmospheric Research (EDGAR), release version 4. 2
[8] International Energy Agency (2008) World Energy Outlook 2008.

Global economic and social development over the last two centuries has been largely achieved through intensive, inefficient and unsustainable use of the earth's finite resources.

The scientists of the IRP point out that during the 20th century, extraction of construction minerals grew by a factor of 34, industrial ores and minerals by a factor of 27, fossil fuels by a factor of 12 and biomass by a factor of 3.6. The total material extraction increased by a factor of about 8 to support a 23-fold GDP growth[9]. Annual extraction of ores, minerals, hydrocarbons and biomass to keep us fed, clothed, housed, mobile, entertained and connected has grown from 7 billion tons in 1900 to 60 billion tons today and, on current trends of growth in population and economic activity, are set to reach 140 billion tons by 2050.

Recognising these hard realities, *The Future We Want*, the outcome document of Rio+20, calls for "*protecting and managing the natural resource base for economic and social development*".

The natural resource base is essential for sustained economic development, a prerequisite for poverty eradication, and natural resources are the foundation for wealth generation in many of the poorest countries. A reduction in stocks of natural capital and in the availability of ecosystem services has not only global impacts but also disproportionately harms the well-being of the poor and significantly reduces the resilience of poorer communities which often depend directly for their sustenance on local environmental resources. Realising the gravity of this situation, the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda (HLP) reiterates that ***the poor directly depend on natural resources, for food, fuel, medicine, shelter and livelihoods, and are especially affected by resource depletion and environmental degradation[10].***

In addition, global inequalities in terms of access to natural resources and to their economic benefits are enormous, both between and within countries. Average use of resources in some developed countries is as high as 30-40 tonnes/person/year, compared to 2 tonnes/person/year for some of the developing countries. Overall, an average citizen in a

[9]UNEP (2011) Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group on Decoupling to the International Resource Panel.
[10] United Nations (2013) A New Global Partnership: Eradicate Poverty And Transform Economies Through Sustainable Development. The Report of the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda

developed country uses each year nearly 24 times as much of material resources and 12 times as much energy as one in a developing country[11].

The **impacts of affluence on the environment** are well known and include the depletion of non-renewable resources, creation of waste, associated pollution and contribution to the destruction of ecosystem services. It may also be possible that poverty exerts a negative impact sometimes on the environment. Out of the exigencies of survival, poorest communities have little choice but to eke out their basic needs and livelihoods from a fragile ecological resource base, and having lost the means to conserve it, they can sometimes damage its productivity and thus the very basis of their livelihoods. These impacts and the need to eradicate poverty, combined with the lack of stable institutional frameworks are drivers of resource-related conflicts in some countries where economic development highly depends on the extraction of valuable natural resources, with economic benefits reaching only a few.

Furthermore, the **current challenges of sufficient and equitable access to natural resources** are certain to increase as the world population is projected to reach 8 billion by 2030, and over 9 billion by 2050[12]; 70% living in resource-intensive urban areas[13]. An additional 3 billion will join the current 2 billion in the middle class as consumers and major resource users[14]. 85% of the increase in population will be in the global south and by 2050, more than 6 billion people (about 70% of the world's population at that time) are expected to be living in cities, with most growth in developing countries. Cities worldwide are already responsible for 60-80% of global energy consumption and 75% of carbon emissions, consuming more than 75% of the world's natural resources. These pressures on the natural resource base are increasing as the *second wave of urbanisation* continues to unfold[15].

At the same time 1.4 billion people still lack access to modern energy services[16] and some 2.5 billion lack basic sanitation facilities[17]. Inequality is also on the rise; today the 1.2 billion poorest people account for 1% of the world's consumption while the billion richest consume

[11] UNEP (2011) Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group on Decoupling to the International Resource Panel.
[12] United Nations, Department of Economic and Social Welfare, Population Division (2013) World Population Prospects: The 2012 Revision, Key Findings and Advance Tables
[13] United Nations, Department of Economic and Social Affairs, Population Division (2012) World Urbanization Prospects: The 2011 Revision
[14] Homi Kharas (2010) OECD Development Centre Working Paper 285, The emerging Middle Class in Developing Countries.
15 UNEP (2013) City-Level Decoupling: Urban resource flows and the governance of infrastructure transitions. A Report of the Working Group on Cities of the International Resource Panel. Swilling M., Robinson B., Marvin S. and Hodson M.
[16] International Energy Agency (2010) World Energy Outlook
[17] World Health Organization and UNICEF (2013) Progress of Sanitation and Drinking Water – 2013 Update

72% of the world's resources[18]. Despite the existence of widespread poverty and under consumption by the poor, global utilisation of resources and their associated impacts has already surpassed sustainable levels under which humanity is expected to operate safely (the *safe operating space*), resulting in climate change, biodiversity loss and changes in the global nitrogen cycle[19]. At the same time, many resources are wasted due to inefficiencies, lack of resource productivity targets and extremely low recycling rates, such as in the case of many special metals used in modern day technologies and applications[20].

One of the core challenges of the Post-2015 development agenda will therefore be to lift one billion out of absolute poverty and meet the needs of nine billion people in 2050 in terms of *energy*, *land*, *water*, *food* and *material* supply, while keeping climate change, biodiversity loss and other impacts within acceptable limits. The twin issues of reducing overconsumption and waste of natural resources on one end, and providing secure access to natural resources and food on the other will have to be addressed simultaneously, ensuring that concurrently neither resource extraction and use nor the disposal of waste and emissions will surpass the thresholds of a *'safe operating space'*.

Another core challenge of the Post-2015 development agenda will be to actually reverse the ongoing environmental degradation and promote the restoration of the natural resource base and of ecosystems services to levels that will ensure the long term provision of human needs and avoid the risk of large scale irreversible changes in the global environment.

Sustainable management of natural resources through efficient resource use should therefore be at the core of poverty eradication and sustainable development. As such, the **establishment of Sustainable Development Goals (SDGs)** must integrate resource management concerns and promote the decoupling of economic growth rates from escalating resource use and environmental degradation. Only in this way will the Post-2015 development agenda effectively contribute to the conservation of the natural resource base for economic and social development, to the eradication of absolute poverty by 2030 and, over the long-term, to the provision of human needs and well-being for current and future

[18] United Nations (2013) A New Global Partnership: Eradicate Poverty And Transform Economies Through Sustainable Development. The Report of the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda.
[19] Rockström, J. et al (2009) A safe operating space for humanity, Nature 461: 472-475.
[20] UNEP (2011) Recycling Rates of Metals - A Status Report, A Report of the Working Group on the Global Metal Flows to the International Resource Panel. Graedel, T.E., Allwood J., Birat J.-P., Reck, B.K., Sibley, S.F., Sonnemann, G.

generations. Achieving these goals will therefore require that all countries determine time-bound resource productivity targets appropriate to their national contexts.

Sustainable Resource Management – *opportunities in the Post-2015 era*

Efficient and responsible use of natural resources will be a new engine to power a socially equitable and environmentally benign economic growth. Through its assessments over the past six years, the International Resource Panel (IRP) has drawn attention to current practices and future opportunities for ensuring the sustainable management of the natural resource base of economic and social development through ***'decoupling the rate of economic growth from escalating resource use and environmental degradation'***. For example, good experiences on technology prospects for decoupling through improved productivity in the use of ***energy***, ***land***, ***water*** and ***materials*** include:

- ***Energy****:* fossil fuel use by the pulp and paper industry in the United States of America declined by more than 50% between 1972 and 2002, largely through energy efficiency measures, power recovery through co-generation and increased use of biomass[21].
- ***Water*****:** In Australia, where GDP rose by 30% and water consumption was reduced in *absolute* terms by 40% during the same short period from 2001 to 2009[22].
- ***Materials*****:** Substantial savings in material use have been realised in recent years through miniaturisation and some by recycling. Much more can be achieved through improved durability of products and sharing of underutilized resources. For example, 80% reductions in greenhouse gas emissions from iron/steel industries can be achieved in the recycling of scrap iron[23].

Many more opportunities for enhancing resource productivity lie not in a specific technology but in policies and processes that enable systemic improvements, cascades of use, and in synergies running through the whole production and consumption chains and life cycle of products.

While there are many examples of systemic improvements that have led to improved resource productivity, the question is why relatively few of these manifestly beneficial opportunities in terms of ***energy***, ***land***, ***water,*** and ***materials*** productivity have been

[21] UNEP (2013) Decoupling in Practice (Decoupling 2) – draft (to be published)
[22] Ibid
[23] Ibid

appropriated and disseminated at the global scale. Part of the answer lies in the fact that there are a variety of resource challenges determined by local contexts that clearly make it impossible to insist that there is a *'one size fits all'* prescription, solution or single policy instrument that can be applied everywhere.

A wide range of measures are required to facilitate continued improvement in the management of ***energy, land, water, food and material resources***. These include framework conditions under which innovations are encouraged; technology development and investment in resource-efficient technologies; education and awareness of resource productivity; design at all levels (for products, services, cities, infrastructures, etc.) for sustainable resource management. While many such options are now available or under serious development, there is a need for visionary political and business leadership in both developed and developing countries to foster the necessary policy co-ordination in the public and private domain, needed to effectively decouple economic growth rates from the escalating use of energy, land, water and materials.

Are resource management concerns being taken into account in current proposals for the SDGs?

The MDGs, adopted at the global summits held in New York in 2000 and Johannesburg in 2002 with a time horizon of 2015, have made tangible progress for different goals in different countries, although with little attention to resource use and related impacts on the environment.

The establishment of SDGs provides an opportunity to focus the attention of political and business leaders on resource management concerns and promotes the needed framework for harnessing the potential benefits of decoupling and sustainable resource management for sustained societal well-being.

However, actual progress towards sustainable development will ultimately depend on how responsibly the planet's natural resources are managed. It is not just the economy that draws much of its sustenance from the natural resource base: the quality of the environment, the well-being of humanity and the very continuance of life itself integrally depends on the natural resource base. These processes and the establishment of SDGs present an opportunity to create a sense of urgency, support policy discourse and take concerted action on resource management concerns.

Incorporating resource management concerns into the SDGs – *a separate goal on Sustainable Resource Management*

One option for incorporation of resource management concerns into the SDG framework will be to establish a separate goal for Sustainable Resource Management with possible sub-goals and associated targets and indicators for ***energy***, ***land***, ***water***, ***food***, ***materials*** and ***other major resource assets***. It should seek to reduce the impact of unsustainable patterns of production and consumption on the natural resource base and the planet's life support systems.

A separate SDG on Sustainable Resource Management would focus on resource productivity, outlining a trajectory for the efficient use of natural resources in an equitable and environmentally responsible manner aimed at decoupling economic growth rates from escalating resource use and environmental degradation.

Goal	***Efficient use of natural resources in an equitable and environmentally benign manner for human well-being in current and future generations.***

The targets would have to take into account different levels of development and common but differentiated responsibilities. By aiming at doubling yearly rates of resource productivity increase – which are necessarily different between developed and developing countries – the following is an example of a target of universal application, focusing on promoting the ***efficient use of natural resources***:

Target A	***Double the yearly rate of resource productivity increase by 2030***
Indicators	• Raw Material Consumption/GDP or Material Footprint[24]/GDP • Total Material Requirement/GDP • Material Requirement/GDP (per sector: energy production, food production, housing, etc.) • Global Land Use for domestic consumption/GDP • Green House Gas Emissions/GDP

[24] Wiedmann, T.O. et al (2013) The material footprint of nations. Proceedings of the National Academy of Sciences.

Increase in resource productivity will require the developed countries to use less than today so that developing countries may gain more from the use of natural resources. The result being: all countries enjoying the benefits of resource productivity translated into improved services of final consumption, sustained access to resources, and a safer environment.

Other possible targets should be formulated to clearly highlight the ***equitable use of natural resources*** (by promoting equal access to and/or attribution of resource consumption on a per capita basis) as well as ensure that socio-economic development will take into account the available safe operating space.

Target B	***Decoupling economic growth rates from escalating use of natural resources to achieve the average material intensity of consumption per capita of 6-8 tonnes/capita/year[25] in 2050***
Indicator	• Average national metabolic rates (material intensity of consumption per capita measured in tonnes/capita) • RMC/capita (raw material consumption per capita or material footprint[26] per capita)

The example above would set a direction where developing countries would achieve a rising share of global resources while industrial countries would have to lower the intensity of their material consumption through significant increases in resource productivity and changes in consumer behaviour.

While a separate goal of this kind will highlight the primacy that sustainable resource management deserves in the SDG framework, the formulation, quantification and timeframe of targets A and B suggested above only outline the trajectory to be adopted. The quantum and timeframe of the targets is debateable and should be the outcome of a political process. The indicators illustrate the kind of measurements and assessments that will be required, and both targets and indicators can be particularised for different resource assets (such as energy, land, water, materials) or production and consumption sectors (energy production, food production and housing, etc.)

[25] UNEP (2011) Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group on Decoupling to the International Resource Panel.
[26] Wiedmann, T.O. et al (2013) The material footprint of nations. Proceedings of the National Academy of Sciences

Incorporating resource management concerns into the SDGs – *mainstreaming Sustainable Resource Management in human well-being goals*

The second and even more important option is to incorporate sustainable resource management concerns in the relevant human well-being goals like food security, water, energy, and urban development, etc. through appropriate targets and indicators. Keeping this in mind, an indicative list of goals, targets, and indicators has been articulated by the IRP for themes that are widely regarded as priorities for the Post-2015 and SDG processes.

The examples of targets and indicators suggested below demonstrate the need to consider complex inter-linkages and synergies among different goals on ***energy***, ***food***, ***water***, ***oceans*** and ***sustainable urban development***. For example, progress on social goals, such as access to drinking water and nutritious food may have increased impact on land and water resources, or progress in terms of poverty reduction may lead to rising material consumption and thus countervail relevant targets on avoiding food waste, on preventing unsustainable/destructive fishing practices, on halting cropland expansion (into grasslands, savannahs and forests), or in reversing land degradation. On the other end, tapping into the resource management potentials in each goal offers wider opportunities for broader developmental goals in terms of:

- **Eradicating absolute poverty** – by breaking the vicious circle of over-consumption, environmental degradation and poverty
- **Ensuring food security and nutrition** – by adopting sustainable use of land based resources
- **Achieving universal access to safe and clean water & sanitation** – by enhancing efficient use of water and nutrients
- **Securing access to universal energy** – by incorporating resource efficient and low carbon energy systems based on renewable energies
- **Creating sustainable livelihoods and equitable growth** - by promoting technologies and innovations for sustainable resource use

Hence, it will be absolutely essential and critical to incorporate sustainable resource management concerns in human well-being goals to explore these opportunities and inter-linkages.

Examples of potential targets and indicators mainstreaming resource concerns in the human well-being goals on ***energy***, ***food***, ***water***, ***oceans*** and ***sustainable urban development*** can include:

Goal	Targets	Indicators
Access to energy, sustainable energy	Reduce the climate forcing of energy supply by 50% by 2050.	• Total climate forcing caused by energy supply • Carbon footprint per person • Non-carbon energy share in energy and electricity • GHG emissions from energy production and use (per capita & per unit of GDP)
	Limit the use of resources (bio productive land, water, metals) associated with energy supply to sustainable levels.	• Resource footprint of the per person energy supply (m^2/person, m^3/person)
	Double the shares of renewable sources in the energy mix by 2030 & increase it to 60% by 2050.	• Renewable energy share in energy & electricity
Ensure sustainable agriculture, food and nutrition security, combat desertification and land degradation	Increase agricultural productivity by X% by 2030	• Yield / hectare • Yield/fertilizer input • Yield/water • Yield/labor • Yield/carbon emission • Yield/soil loss
	Increase % of nutrients (mainly Nitrogen & Phosphorous) from recycled origin (not synthetically fixed nor mined) in agriculture to X% (TBD)	• % wastewater treated with nutrient recovery (also linked to sanitation) • % of animal waste recycled
	Increase nutrient use efficiency in agriculture to reduce losses (i.e. close gap between nutrient input and plant uptake)	• Kg of input N, P, K per kg of N, P, K in crop
	Restore agricultural productivity of 1/3 of severely degraded abandoned land by 2030	• % of restored agricultural land
	Increase area of land under organic agriculture from X% to Y%	• % Share of organic foods and produce in the market • Change in per capita consumption of organic food and products by 2050 (2014 baseline)

Goal	Targets	Indicators
Ensure integrated management of water resources to provide for all uses	Provide universal access to safe drinking water and good sanitation by 2030	• Total percentage water recycled or number of uses of water • Proportion of water users (households, industry and agriculture) recycling and re-using water • Increase in water efficiency in agriculture by x%, industry by y% and households by z%
	Maintain environmental and ecological flow in freshwater bodies and river systems to sustain water related ecosystem services	• Biocapacity of water bodies (BOD) • Regulate ground water withdrawals within annual recharge capacity
Sustainable Urban Development	Reduce GHG emissions from the construction and operation of buildings	• GHG emissions from construction sector • Electricity consumption in buildings • Heating related emissions • % nutrients from wastewater re-cycled into agriculture
	Decouple rate of urban growth (increase in number of households located in urban area due to in-migration and natural increase) from the rate of increase in waste outputs and in the use of water, land, energy and building materials	• Number of households per city • To reduce land requirements via densification: number of households/persons per hectare (with 30 persons/hectare as a minimum) • To promote water efficiency: average quantity of water used per household/person in litres/household and/or per capita (taking into account climatic & topographical conditions and water availability) • To promote energy efficiency: average electricity consumption (KWh) per household/person (taking into account climatic conditions) • To promote renewable energy: total quantity of renewable energy generated from renewable sources as a percentage of total energy used (KWh sourced from renewable sources) • To promote efficient building practices: average quantity of building materials needed to construct the average household

Goal	Targets	Indicators
		structure (tons of building materials per square meter) • To promote zero waste: total amount of solid waste (in tonnes per annum) that goes to landfill, and total amount of solid waste left uncollected (in tons per annum)
Sustainable use of oceans, seas, rivers and lakes, sustainable fisheries, and addressing ocean eutrophication	Reduce share of overexploited ocean fish stocks by 20 %	• Proportion of fish stocks within safe biological limits • % of nutrients recovered from wastewater & recycled into agriculture
	Eliminate policies that support unsustainable fisheries practices by 2020	