

## **The role of offsets in ecologically sustainable development**

*By Georgia Eastment MSc., HOPE researcher (Vic)*

With the arrival of the Anthropocene, the relationship between humans and the natural world is rapidly changing. Through ecologically sustainable development (ESD), humanity has tried to continue pursuing economic development within the biophysical limits of the Earth. One of the most common forms of ESD has been offsets, which compensate for the significant residual adverse impacts developments have on the environment. Whilst this does facilitate environmental awareness and regeneration, it can often be used in a performative way. Offsets can be used to justify the continuation of environmental degradation and involve their own risks to the environment. This research article will contribute to the discussion of offsets by providing a critical perspective. It will discuss the history of ESD, the current policy landscape, and the challenges and threats associated with offsets.

### **The Anthropocene**

The Anthropocene Epoch is a proposed unit of geological time characterised by the significant impact that humans have had on the Earth (Schuijers, 2017). As discussed in *The Economist* in 2011, “humans have become a force of nature reshaping the planet on a geological scale but at a far-faster-than-geological-speed.”

There is some debate concerning the beginning of the Anthropocene Epoch. Some argue for the Industrial Revolution, where the increased reliance on natural capital and the expansion of production brought absolute changes to wealth (Zalasieqicz et al., 2015). The Agricultural Revolution, beginning in 18th century Britain has also been put forward as the start of the Anthropocene. This saw agricultural production intensified, using developments such as the plough and selective breeding of livestock. The 1950s ‘plastic age’ is another contender for the Anthropocene, where various forms of plastics were mass produced for their durable and flexible properties. As plastic cannot biodegrade, it breaks down into microplastics which have recently been found in the deepest part of the ocean, the Mariana trench. However, The Great Acceleration is the most accepted cause of the Anthropocene (Zalasieqicz et al., 2015). This marks the point in the 1950s where human activity surged, including rapid population growth, technological innovation, the economy, agricultural inputs, infrastructure, and resource usage.

Whilst this is still debated, there is no doubt that since the Industrial Revolution, humans have tried to secure their place at the top of the food chain. All four events have increased reliance on fossil fuels and placed increasing pressure on the Earth’s resources. Humans have been warned about the consequences of this for a long time. For example, in 1798, Malthus’ *Essay on the principle of population* framed food production as the limit to growth. He forecast that the growing population would exceed the capacity of the food supply system to meet demand. Disease and famine would then realign the population with the Earth’s biophysical limits. Whilst these predictions did not come true, this is not to say that they will not come true in the future. It is widely agreed in the scientific community that the consequences of environmental degradation and climate change are exacerbating and becoming more visible. Continued overreliance on the Earth’s natural resources is contributing to increasing temperatures, extreme weather events, wildfires, droughts and food supply disruptions (Schuijers, 2017). Decreasing biodiversity is another adverse impact, leading to an increase in species extinction rate and the collapse of ecosystems. To mitigate some of these impacts, ESD has been developed as a common approach reducing the possibility of environmental harm.

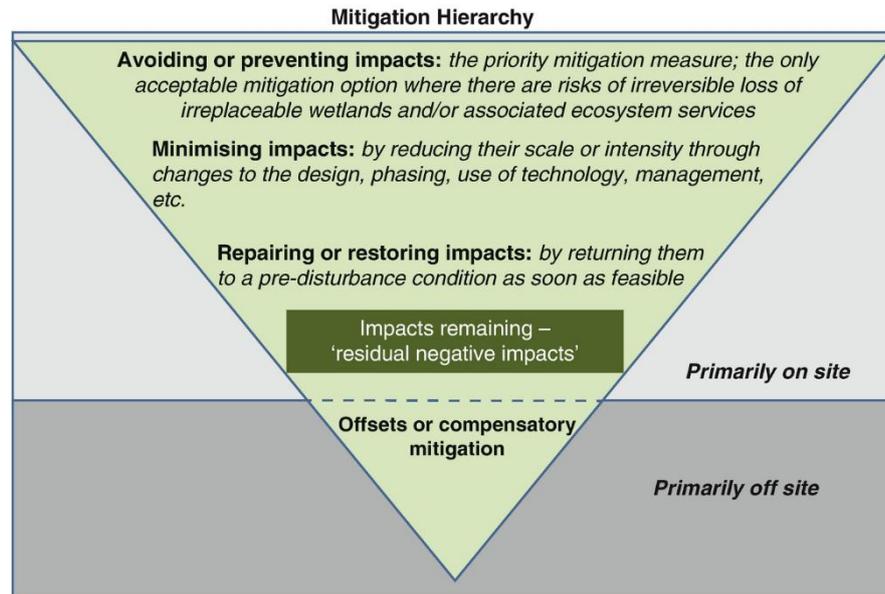
### **Ecologically Sustainable Development**

ESD has been described as a more holistic approach to decision-making. Although there is no universally accepted definition of ESD, it aims to ensure that decisions regarding development take into account economic, environmental and social considerations (Schuijers, 2017). In principle, this places a check on the way that nature is exploited; it enhances the ecological processes of the Earth by remaining within the Earth’s biophysical limits. Although it invites multiple critiques, it is an important approach that embodies the mitigation hierarchy, the precautionary principle and cause-and-effect relationships.

#### *Mitigation hierarchy*

As part of ESD, the mitigation hierarchy has been developed as a tool to manage development risks to the environment (Arlidge et al., 2018). This is commonly used in Environmental Impact Assessments (EIAs) by proponents (Brownlie, 2018). In order, there are four main stages: avoid, minimise, remediate and offset (Figure 1). Measures should be taken to prevent, reduce and restore any impacts a

development has on the environment (Arlidge et al., 2018). If these measures are unable to be taken, or there are remaining residual impacts, this should be addressed through offsetting.



**Figure 1.** The mitigation hierarchy. Sourced from Brownlie (2018).

Offsetting aligns with the polluter pays principle, requiring proponents to compensate for residual adverse impacts on the environment. There are two main types of offsets: biodiversity offsets and carbon offsets (Arlidge et al., 2018). Biodiversity offsets refer to compensatory measures to address the residual adverse biodiversity impacts arising from developments. The aim is to ensure there is no net loss to biodiversity, and includes aspects such as species composition, habitat structure, ecosystem function and cultural ecosystem services (Bull et al., 2013). Carbon offsetting involves the reduction or removal of carbon dioxide from the atmosphere to compensate for the emissions produced elsewhere. As carbon is now considered a commodity, carbon offsets often take place in the market through various emissions trading schemes.

#### *Precautionary principle*

The mitigation hierarchy encompasses the precautionary principle, which is an important strategy to manage environmental harm in the face of uncertainty. Although science has had an immense role in designing and innovating measures to protect the environment, scientific knowledge is not a crystal ball that performs prophetic prediction. Particularly, as rapid environmental, social, and economic changes continue to alter the Earth's dynamics in unprecedented ways, some cause-and-effect relationships remain unclear. In the face of such uncertainty, the precautionary principle states that cautionary measures should be proactively adopted to avoid, minimise or restore potential adverse environmental outcomes. Accordingly, the precautionary principle supports the use of the mitigation hierarchy in consecutive order; avoiding negative environmental or social impacts is more reliable and desirable than subsequent actions.

Despite this, ESD can also be seen as another buzzword. Just like 'sustainable development'. ESD, as it stands today, is a process which fuels flawed capitalistic systems which have shown to favour the economic pillars of sustainable development at the expense of environmental and social pillars (Rist, 2007). Society has become indoctrinated to see it as what it should be; without probing further questioning, it has become widely accepted in society as the panacea to environmental degradation. This is reflected in the regulatory context that promotes, rather than enforces ESD and the precautionary principle.

#### **Regulatory context**

*The Inter-governmental Agreement on the Environment (IGAE) 1992* is an agreement between the federal, state and local levels of government outlining their roles and responsibilities in regard to environmental matters. The precautionary principle is embedded in this agreement, in which decisions that affect the environment, where there is any serious or irreversible threat to the environment in light

of scientific uncertainty, should take reasonable action to avoid environmental damage. However, this is not legally binding and thus signatories are not required to enforce the precautionary principle.

The *Environmental Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) outlines the Federal Government's role in protecting the environment and matters of national environmental significance (MNES). Under this Act, development projects that are likely to impact any of the nine MNES, including endangered or critically endangered species, requires an environmental impact assessment by the project's proponent. This is then referred to the Minister, who must apply the precautionary principle by weighing up projected environmental, social, and economic outcomes. The EPBC Act also outlines offsets as an appropriate measure to reduce residual impacts of development projects. Where impacts cannot be avoided, mitigated, or remediated, offsets should be considered as a course of action, and the suitability of this will be assessed by the Minister. They will then decide as to whether the project's environmental threats are justified, and if the project should be approved. Where developments are likely to impact the environment, but do not concern MNES, each state and territory has their own regulations.

#### *New South Wales*

The *Protection of the Environment Administration Act 1991* (NSW) states that scientific uncertainty surrounding serious or irreversible risks is grounds for environmental protection measures. Decision-making should also be informed by careful evaluation of the potential environmental impacts. This Act also establishes the Environment Protection Authority (EPA) as a formal body responsible for preventing and reducing risks to the environment.

The *Environmental Planning and Assessment Act 1979* (NSW) encourages ESD through planning tools and instruments. This Act defines ESD and requires decision-making about environmental planning and assessment to integrate social, economic, and environmental outcomes.

#### *Victoria*

Although the *Environmental Protection Act 1970* (Vic) does not mention ESD, it performs the same functions as the *Protection of the Environment Administration Act 1991* (NSW), including the establishment of an EPA and decision-making guidelines, outlined above.

The *Environment Effects Act 1978* (Vic) also requires an Environmental Effects Statement to be prepared, outlining the predicted environmental, social, and economic impacts of a project, based on baseline conditions. This will be assessed by the Minister for Planning, who will determine if the adverse impacts do not justify any social or economic gains.

#### *Other states and territories*

Other state and territory policies include the *Environmental Protection Act 1993* (SA); *Environmental Management and Pollution Control Act 1994* (Tas); *Environmental Protection Act 1997* (ACT) and the *Gungahlin Development Authority Act 1996* (ACT); *Environmental Protection Act 1994* (Qld) and the *Planning Act 2016* (Qld); *Planning and Development Act 2005* (WA). Similar to Victoria, Western Australia also avoids explicitly referencing ESD.

Whilst there are slight differences, the ESD and precautionary approach of these policies is similar. These policies share the aim of assessing environmental impacts to balance the demand for improved infrastructure and development with environmental concerns. Rather than requiring compulsory adherence to the mitigation hierarchy, environmental protection is instead encouraged. This is why many actors choose offsetting over avoidance, minimisation, and remediation, as it still permits environmental damage. For example, Shell, as part of its goal to achieve net zero emissions by 2050 have an offsetting project in Queensland to regenerate the native Brigalow Forest (Shell, 2022). This provides the illusion that Shell is ecologically responsible, when in reality, it will continue drilling more oil and gas. These policies also focus on reducing risks of serious or irreversible harm, without a clear definition of what constitutes this form of harm. This therefore permits less 'significant' threats to occur, which can cumulate and amplify, potentially destabilising the socio-ecological system. The lack of stringent regulations also enables mitigation measures to be implemented partially, or not at all (Bull et al., 2013).

#### **Demystifying offsets**

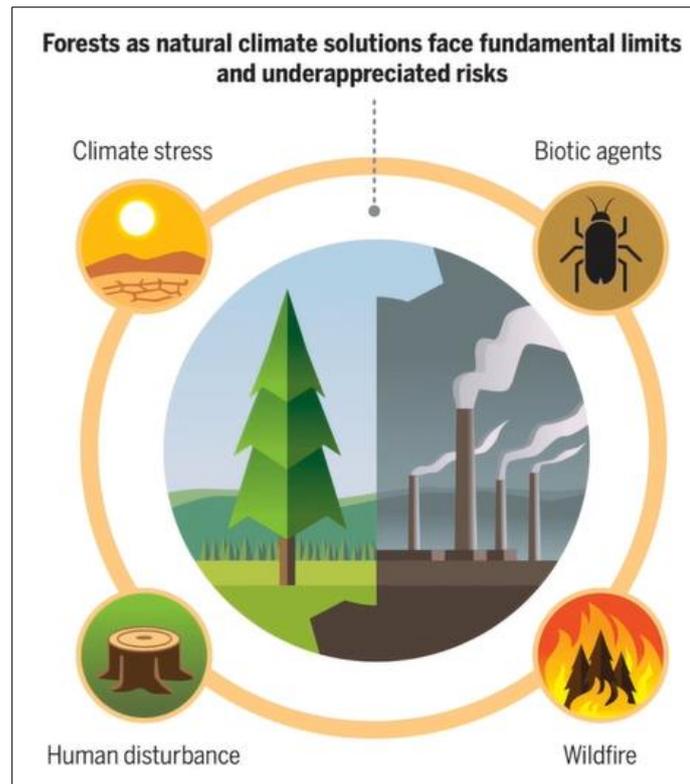
Offsets diverse from the precautionary principle, as they are reactive, rather than proactive. There are also many risks involved. Dynamic baselines make the task of projecting the trajectory of the environment difficult. Baselines, which indicate the start point of an evaluation, can provide insight into

if offsets are contributing to improved environmental outcomes. Yet, it is not clear how an acceptable baseline is determined. Multiple metrics is another issue. Value judgements are inevitable when determining thresholds for which offsets are required, or no longer appropriate. There is currently no universally accepted threshold for carbon emissions and biodiversity loss that specify at what point offsets are necessary (Bull et al., 2013). Without guidelines indicating acceptable measurements, there will be no consistency in the measurement of offsets. For example, in Western Australia, only 39% of offsetting outcomes were considered effective, largely due to the lack of criteria for measuring outcomes and long-term management (May et al., 2017).

Due to Australia's weak regulatory context, biodiversity offsets can be out-of-kind, rather than in-kind. In-kind biodiversity offsets require that losses are compensated with equivalent gains of the same value (Bull et al., 2013). Out-of-kind offsets have been made popular through the interpretation of 'ecological redundancy'. This refers to an ecosystem by which multiple species may share the same, or similar role. This means that the particular socio-ecological system is able to be more resilient to perturbations. The science surrounding redundancy stresses the importance and value of redundant species, and the need to protect them to increase the capacity of ecosystems to absorb shocks and sustain their fundamental functions. However, many policies have interpreted this to mean that redundant species can be adversely impacted with little or no harm to the environment. It can also be argued that all ecosystems have unique features and properties that are unable to be replicated elsewhere. For example, Queensland's Back on Track species prioritisation framework, implemented in 2005, prioritises species based on their social value, ecological redundancy, and cost management (Alliance to Save Hinchinbrook Inc., No 86 to Senate Environment and Communications References Committee, *Inquiry into Environmental Offsets*, April 2014, [3]). This framework allows offsets to be used out-of-kind, leading to cumulative losses, as valuable diverse species are being 'compensated' through the protection of a different species. This framework is severely outdated.

Using offsets as a market based instrument also begs the question: can we really save nature by putting a price on it? Viewing nature through an economic lens reinforces the dominion humans have over nature (Alliance to Save Hinchinbrook Inc., No 86 to Senate Environment and Communications References Committee, *Inquiry into Environmental Offsets*, April 2014, [3]; Bumpus & Liverman, 2010; Demspey & Chiu Suarez, 2016). Yet, nature has a value greater than its economic value. It is the very basis of what keeps us alive. To many, nature is about identity, culture, spirituality, relationships and much more. This is both the case of carbon and biodiversity offsets (Alliance to Save Hinchinbrook Inc., No 86 to Senate Environment and Communications References Committee, *Inquiry into Environmental Offsets*, April 2014, [3]). This market based approach also lacks strong accountability. For example, there are no clear rules to avoid double counting in the international emissions trading system. Double counting is relevant when emissions are traded between countries, or between a country and an entity such as the ICAO (Schneider et al., 2019). Without strict regulations and universal rules in the international carbon market; emissions reductions activities can be recorded simultaneously by both actors, enabling higher emissions to occur.

Planting trees has also become a popular way to offset carbon emissions. There is no doubt that trees play a vital role in sequestration, however, it is often unjustifiably framed as the panacea to climate change mitigation. Firstly, forests are not necessarily permanent (Anderegg et al, 2020; Figure 2). Due to the changing climate, events such as wildfires, droughts, and abiotic disturbances can contribute to tree mortality, releasing the carbon previously stored and preventing future sequestration (Anderegg et al., 2020). Human pressures also threaten this permanency. For instance, some forests which were sold as carbon credits in Australia, were later deforested (May et al., 2017). Secondly, trees that sequester the most carbon, such as hardwood trees, are often planted (Anderegg et al., 2020). This is counteractive, particularly if they are non-native to the ecosystem. They may become invasive, or imbalance the ecosystem's dynamics thereby hindering its survival.



**Figure 2.** The increasing risks that are threatening the use of forests for offsetting purposes. Sourced from Anderegg et al. (2020).

In pursuit of ESD, many offsetting projects are conducted overseas, allowing harmful activities to go unchecked. Such offsetting programmes, including the United Nations' REDD+ which Australia invests in, can adversely affect livelihoods and Indigenous populations (Bumpus & Liverman, 2010; Demspey & Chiu Suarez, 2016; Hein et al., 2018). Developed countries, who are responsible for a large proportion of emissions, are placing the offsetting responsibility on developing nations who often contribute a much smaller proportion. Consent is also often negated, forcing this burden onto populations (Bumpus & Liverman, 2010; Demspey & Chiu Suarez, 2016). Not only can this alter traditional interactions with nature, but it can also lead to Indigenous peoples being displaced.

This research paper has demonstrated the need for stronger policies to regulate ecologically sustainable development. We must call on our government(s) to take environmental protection seriously. Stringent policies should be implemented to ensure a proactive approach to environmental protection, rather than permitting offsets as 'the easy way out'. Regulation is an important step towards quality decision-making. Without it, adverse impacts on the environment will be overlooked. Without major changes to the environmental policy landscape and EIA processes, decisions may be used to justify the resource exploitation, and even the dispossession of vulnerable persons, under the guise of improved infrastructure and economy. Without more stringent accountability, ESD, and therefore offsets, prove to be nothing more than a false promise on paper.

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