Legislative Protection for the Soil Environment and Climate Change

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Abstract Recent court decisions in Australia and in overseas jurisdictions have made important progress in society's acceptance of the significance of climate change in the long-term protection of the environment. The term 'climate litigation' is now generally used to refer to legal proceedings initiated to establish responsibility for a failure to prevent or reduce the rate of climate change and/or mitigate its negative consequences. Such legal proceedings are being initiated in courts, tribunals and other rule compliance monitoring bodies, operating around the world, at the domestic, regional, or global level. One decision, in the New South Wales Land and Environment Court on 26 August 2021, orders the New South Wales Environment Protection Authority to develop environmental quality objectives, guidelines and policies to ensure protection of the environment from climate change with regard to its duties under the Protection of the Environment Administration Act 1991. This decision is regarded as a landmark decision in New South Wales in that it orders a statutory authority to exercise its duty and legal responsibilities under the Protection of the Environment Administration Act with regard to the level of seriousness that climate change impacts have reached for the New South Wales environment. The case is also significant because the definition of "environment" under the Protection of the Environment Administration Act encapsulates a broad range of ecological elements, including the "soil". In this context, this chapter argues that the decision is important for a number of reasons including: by interpretation "soil" is a component of the "environment" and it should be protected from climate change under the Protection of the Environment Administration Act; the way the decision is made provides a guiding framework which can used to examine existing environmental laws for protection of the soil environment against climate change; and it provides a guiding framework to prepare new soil legislation with the requisite procedures to develop environmental quality objectives, guidelines and policies to protect the soil environment from climate change. Having regard to these various aspects of the decision, they provide a guiding structure in which to assess the protection of the soil

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environment in New South Wales, but also a procedure which might be beneficial to other countries to assess the legal protection of the soil environment. The way soil is being used in Australia and around the world is directly contributing to global warming by releasing carbon dioxide and other greenhouse gases to the atmosphere. Soil degradation from agricultural land use, vegetation clearing and urban and infrastructure projects and pollution of soil from industrial works require closer attention from legislative and policy structures. Therefore, it is appropriate that increasing attention must be placed on the protection of the soil environment through the adoption of legislative, policy and mitigation responses which prevent the use of soil in a manner that makes it a significant contributor to climate change.

1 Introduction

On 9 August 2021 the United Nations Secretary General, António Guterres stated that the latest report of the Intergovernmental Panel on Climate Change (hereafter, IPCC) is a "code red for humanity". He said "The alarm bells are deafening, and the evidence is irrefutable: greenhouse-gas emissions from fossil-fuel burning and deforestation are choking our planet and putting billions of people at immediate risk. Global heating is affecting every region on Earth, with many of the changes becoming irreversible".[1] He went on to say that "The viability of our societies depends on leaders from government, business and civil society uniting behind policies, actions and investments that will limit temperature rise to 1.5 °C." In this regard, a number of recent legal decisions in Australia and in overseas jurisdictions have made important progress in society's acceptance of the significance of climate change in the long term protection of the environment. The term 'climate litigation' is now generally used to refer to legal proceedings initiated to establish responsibility for a failure to prevent or reduce the rate of climate change and/or mitigate its negative consequences. Such legal proceedings are being initiated in courts, tribunals and other rule compliance monitoring bodies, operating around the world, at the domestic, regional, or global level.[2] In one case in particular, *Bushfire Survivors for Climate Action Incorporated v Environment Protection Authority* (hereafter, BSCA v EPA),[3] in New South Wales (hereafter, NSW), Australia, a climate action group sought an order in the New South Wales Land and Environment Court (hereafter, LEC), in the nature of mandamus[4] to compel the New South Wales Environment Protection Authority (hereafter, EPA), to perform a statutory duty to

[1] https://www.un.org/press/en/2021/sgsm20847.doc.htm (Last access: 22 June 2022).

[2] Preston (2018), p. 132.

[3] https://www.caselaw.nsw.gov.au/decision/17b7569b9b3625518b58fd99 (Last access: 22 June 2022, hereafter, [2021] NSWLEC 92); and https://www.lexology.com/library/detail.aspx?g=8280d79f-ef5b-491c-83df-da7086acc60f (Last access: 22 June 2022).

[4] A writ or order that is issued from a court of superior jurisdiction that commands an inferior tribunal, corporation, Municipal Corporation, or individual to perform, or refrain from performing,

develop environmental quality objectives, guidelines and policies to ensure the protection of the environment from climate change.[5] This decision, together with other cases discussed below, highlight numerous legal and human-related issues related to climate change including: harm to the natural and ecological environment, intergenerational harm to children of the current generation who are affected by decisions made today that affect the climate; obligation of statutory authorities to invoke the duty that they have to climate management under respective statutes; the importance of clarity of meaning of key words and phrases in environmental statutes; the need to take into account the latest scientific information of the IPCC in decision-making; the effect of climate change on food supply, loss of territory and habitable areas, endangering health, and the human right to a climate system to sustain human life.

It is essential that increasing attention must be placed on the protection of the soil environment through the adoption of legislative, policy and mitigation responses which prevent the use of the soil environment so that it contributes to climate change. However, the various arguments presented in litigation in Australia and in overseas jurisdictions make important progress in society's acceptance of the significance of climate change in the long term protection of the environment. Most importantly for soil is the role that climate science should play in expert evidence in litigation where climate change is the legal challenge that affects the soil environment in particular. On the basis of the facts presented in BSCA v EPA, and other cases referred to in this chapter, IPCC data is likely to be incontrovertible and accepted by the courts as evidence of the risks and threat of climate change.

Before the following examples of climate litigation are discussed, and the BSCA v EPA case in particular, as regards the preparation of policy, guidelines and standards that protect the environment against climate change and why soil falls within the definition of "environment," it is pertinent to review what soil is ecologically. It is also important to understand what contribution to global warming soil makes from the release of carbon dioxide (hereafter, CO_2) to the atmosphere from unsustainable land use practices. A basic understanding of these relationships further justifies the importance of the BSCA v EPA decision in ensuring that the NSW EPA has a duty to prepare policy, guidelines and standards to protect the soil environment of NSW from climate change.

a particular act, the performance or omission of which is required by law as an obligation; https://legal-dictionary.thefreedictionary.com/mandamus (Last access: 22 June 2022).

[5] [2021] NSWLEC 92 paras 1,2.

2 Soil and Climate Change

To avoid the most dangerous effects of climate change, the Paris Accord recommends limiting global warming to less than 2 °C above pre-industrial levels.[6] According to the IPCC, one of the critical activities will be the removal CO_2 from the atmosphere, as one of the main greenhouse gases (hereafter, GHG) contributing to global warming.[7] Sequestering carbon in soil, however, is a natural way of removing CO_2 from the atmosphere with fewer impacts on land and water, less need for energy, and lower costs. The term "carbon sequestration" is used to describe both natural and deliberate processes by which CO_2 is either removed from the atmosphere or diverted from emission sources and stored in the terrestrial environment (vegetation, soils, and sediments).[8] Before human-caused CO_2 emissions began, the natural processes that make up the global "carbon cycle" maintained a near balance between the uptake of CO_2 and its release back to the atmosphere. In this regard, with the knowledge that society now has on the impact of released terrestrial carbon on the atmosphere, society should now strive to keep as much natural carbon in the soil and in landscape "sinks" by adopting sustainable land management practices.

Existing CO_2 uptake mechanisms, or carbon "sinks", are insufficient to offset the accelerating pace of emissions related to human activities. Currently, 33% of the global soils have been degraded and have lost much of their soil organic carbon (hereafter, SOC) through the historical expansion of agriculture and pastoralism and subsequent land-use conversion from native ecosystems (e.g., peatlands, forests, grasslands) to arable land.[9] This has resulted in a decline in soil structural stability, increased erosion risks, and reduced water storage and nutrient supplies. Soil degradation has become a major threat to food security, especially in developing countries. Better land management and agricultural practices enhance the ability of soils to store carbon and help combat global warming. The amount of carbon that

[6] At COP 21 in Paris, on 12 December 2015, Parties to the UNFCCC reached a landmark agreement to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future. The Paris Agreement's central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius; https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement/key-aspects-of-the-paris-agreement (Last access: 22 June 2022).

[7] IPCC Summary for Policymakers (2021) (hereafter, IPCC SPM (2021)).

[8] United States Geological Survey (2008), p. 2, "Terrestrial sequestration (sometimes termed 'biological sequestration') is typically accomplished through forest and soil conservation practices that enhance the storage of carbon (such as restoring and establishing new forests, wetlands, and grasslands) or reduce CO2 emissions (such as reducing agricultural tillage and suppressing wildfires)"; https://pubs.usgs.gov/fs/2008/3097/pdf/CarbonFS.pdf (Last access: 22 June 2022).

[9] Amelung et al. (2020), p. 2; Hannam (forthcoming).

soils can absorb and how long they can store it varies by location and is effectively determined by how the land is managed.[10]

With regard to NSW, a recent emissions overview specifies that CO_2 and other GHG are produced in NSW by a variety of activities where agriculture, land use and land use change combined account for 21% of emissions.[11] Further, in 2019 around 141 megatonnes (Mt) of CO_2-equivalent was emitted in NSW, and agriculture comprised 12% (16Mt) of the total.[12] Agricultural practices that disturb the soil such as tilling, planting mono-crops, removing crop residue, excessive use of fertilizers and pesticides and over-grazing expose the carbon in the soil to oxygen, allowing it to burn off into the atmosphere. In other parts of the world deforestation, thawing permafrost, and draining peatlands cause soils to release carbon.[13] In Australia, agriculture is the primary source of anthropocentric methane emissions (60.4% of national emissions between 1990 and 2011), and cropping and grazing soils represent Australia's potential terrestrial sink.[14] However, agriculture and land management practices that increase soil carbon also provide other benefits which explain why it is essential that there must be a high focus on soil in the management of climate change.[15] Fertile soil produces more food, biodiversity, has better moisture-holding capacity, and is less susceptible to erosion, nutrient loss, and desertification.

2.1 Why Soil Must Be Protected

Soil has been defined by the Council of Europe as an integral part of the earth's ecosystems and is situated at the interface between the earth's surface and bedrock. It is subdivided into successive horizontal layers with specific physical, chemical and biological characteristics. From the standpoint of the history of soil use, and from an ecological and environmental point of view, the concept of soil also embraces porous sedimentary rocks and other permeable materials together, with the water

[10] Ibid. Amelung et al. (2020), p. 2.

[11] https://climatechange.environment.nsw.gov.au/About-climate-change-in-NSW/Causes-of-climate-change (Last access: 22 June 2022); note that in the United Nations Environment Programme (2021) Emissions Gap Report, Section 2.2 provides an overview of current trends in total global GHG emissions and global carbon dioxide (CO2) emissions from fossil fuel use and industry-related sources.

[12] https://climatechange.environment.nsw.gov.au/About-climate-change-in-NSW/NSW-emissions (Last access: 22 June 2022).

[13] Cho (2018): https://news.climate.columbia.edu/2018/02/21/can-soil-help-combat-climate-change/ (Last access: 22 June 2022).

[14] Finn et al. (2014), p. 1, www.publish.csiro.au/CP/CP14116 (accessed 30 October 2021).

[15] See Farmers for Climate Action (2021) https://farmersforclimateaction.org.au/wp-content/uploads/2021/09/FCA-EY-FINAL-Report-Low-emissions-future (accessed 30 October 2021).

that these contain, and the reserves of underground water.[16] In this context, soil has a fundamental role in the terrestrial ecosystem as a whole, as a three dimensional body performing a wide range of ecological functions.[17] Alteration of soil processes leads to changes in the function of ecosystems, and many environmental problems that become apparent in other media actually originate within the soil. It is essential that the principal functions of soil, which include its ecological functions, cultural functions, and its land-use functions, must strongly influence how the soil environment is managed to remain ecologically sustainable and afford protection against climate change. The ecological functions, in particular, should be qualitatively and quantitatively safeguarded and conserved in the long term to conserve biodiversity and maintain human life.[18] Many changes in the Earth's climate system, which urgently need to be controlled, are significantly changing the soil environment and causing soil degradation. Soil degradation is defined as a process that lowers the current and/or the potential capability of the soil to produce goods or services and six specific processes are recognised as the main contributors to soil degradation: water erosion, wind erosion, waterlogging and excess salts, chemical degradation, physical degradation, and biological degradation.[19] In this regard, the way soil is being used, in NSW and around the world, is directly contributing to global warming by releasing CO_2 to the atmosphere on the one hand, and losing its ability to store carbon on the other hand.[20]

Climate change is already affecting every inhabited region across the globe, with human influence contributing to the many changes in weather and climate extremes. Evidence of observed changes in extremes such as heatwaves, heavy precipitation, droughts, and tropical cyclones, and, in particular, their attribution to human influence, has strengthened with the IPCC's AR6.[21] Human influence has likely increased the chance of compound extreme events since the 1950s and it seems certain that hot extremes, including heatwaves, have become more frequent and more intense across most land regions. Future emissions will cause additional warming, but total warming is compounded by past and ongoing CO_2 emissions.[22] Also, since the 1950s, cold extremes, including cold waves, have become less

[16] Council of Europe (1990).

[17] Sheals (1969).

[18] Protocol on the Implementation of the Convention concerning the Protection of the Alps of 1991 in the area of Soil Protection, Article 1(2) sets out the multifunctional role of soil.

[19] Hannam and Boer (2002), p. 12.

[20] State of NSW and Office of Environment and Heritage (2018), p. 6; https://www.bing.com/search?q=soil+carbon+in+new+south+wales&form=ANNTH1&refig=a2b77a0f2a484987a8b562b82e327a68 (Last access: 22 June 2022).

[21] Ibid. IPCC SPM (2021) -10.

[22] Compound extreme events are the combination of multiple drivers and/or hazards that contribute to societal or environmental risk. Examples are concurrent heatwaves and droughts, compound flooding (e.g., a storm surge in combination with extreme rainfall and/or river flow), compound fire weather conditions (i.e., a combination of hot, dry, and windy conditions), or concurrent extremes at different locations.

frequent and less severe, and that human-induced climate change is the main driver of these changes. Some hot extremes observed over the past decade would have been extremely unlikely to occur without human influence on the climate system.[23]

The frequency and intensity of heavy precipitation events have increased since the 1950s over most land areas for which observational data are sufficient for trend analysis, and human-induced climate change is seen by the IPCC as the main driver.[24] Human-induced climate change has contributed to increases in agricultural and ecological droughts[25] in some regions due to increased land evapotranspiration.[26] Global surface temperature will continue to increase until at least the mid-century under all emissions scenarios considered by IPCC, and global warming of 1.5 °C and 2 °C will be exceeded during the twenty-first century unless deep reductions in CO_2 and other GHG emissions occur in the coming decades.[27] From a regional perspective, some mid-latitude and semi-arid regions, and the South American Monsoon region, are projected to see the highest increase in the temperature of the hottest days, at about 1.5 to 2 times the rate of global warming. It is very likely that heavy precipitation events will intensify and become more frequent in most regions with additional global warming. At the global scale, extreme daily precipitation events are projected to intensify by about 7% for each 1 °C of global warming. The proportion of intense tropical cyclones (categories 4–5) and peak wind speeds of the most intense tropical cyclones are projected to increase at the global scale with increasing global warming. Additional warming is projected to further amplify permafrost thawing, and loss of seasonal snow cover.[28]

2.2 *Soil Impacts*

The current trend of global warming has a special impact on soil functionality. Climate change alters the drivers of natural climate variability and climate extremes, with subsequent impacts on terrestrial ecosystems and natural land processes. As a significant consequence, the increase in climate variability, extreme climatic

[23] Ibid. IPCC SPM (2021) -10.

[24] Ibid. IPCC SPM (2021) -10.

[25] Agricultural and ecological drought (depending on the affected biome): a period with abnormal soil moisture deficit, which results from combined shortage of precipitation and excess evapotranspiration, and during the growing season impinges on crop production or ecosystem function in general. Observed changes in meteorological droughts (precipitation deficits) and hydrological droughts (streamflow deficits) are distinct from those in agricultural and ecological droughts and addressed in IPCC AR6 (Chapter 11).

[26] Ibid. IPCC SPM (2021) -11, the combined processes through which water is transferred to the atmosphere from open water and ice surfaces, bare soil, and vegetation that make up the Earth's surface.

[27] Ibid. IPCC SPM (2021) -17.

[28] Ibid. IPCC SPM (2021) -20.

phenomena, torrential rains and floods are affecting the stability of soils and their ability to buffer extreme climatic phenomena and maintain productivity and biological diversity over the land. Conversely, soil degradation especially due to non-adjusted land management affects important parameters of climate regulation and the atmospheric chemical composition.[29]

Legislative systems must be capable of adapting to the problems that arise from the changing characteristics of the climate and its impact on the soil environment, in a manner depending on the bioclimatic zone and the intrinsic vulnerability of the soil. As global warming continues, soil will release more carbon than was previously thought.[30] Climate change impacts the soil through changes in both soil erosion and rainfall erosivity. The amount of erosion will, therefore, depend upon the combination of the power of the rain to cause erosion and the ability of the soil to withstand erosion. Thus, soil erosion is a function of the erosivity of the rain and the erodibility of the soil.[31] A change in the rate of soil erosion from natural rates to an accelerated rate, caused by increased intensity of rainfall, can have significant implications for the ecological stability of agricultural land and water quality. While some regions are likely to suffer from more droughts in the future, other regions are expected to face the opposing issues of torrential rains and increased flooding. Projected changes in climate are not limited to increases in temperature and heat waves; large changes in rainfall patterns are also expected to occur and these will have a significant impact on the pattern of soil erosion. Continued global warming is projected to further intensify the global water cycle, including its variability, global monsoon precipitation and the severity of wet and dry events. A warmer climate will intensify very wet and very dry weather and climate events and seasons, with implications for flooding or drought, but the location and frequency of these events depend on projected changes in regional atmospheric circulation, including monsoons and mid-latitude storm tracks.[32]

[29] Rubio et al. (2021), pp. 3–4.

[30] Studies that have heated soils 5 to 20 cm deep found that the soil would release 9 to12 percent more CO_2 than normal. But deeper levels of soil contain more than 50 percent of global soil carbon and after heating soils to 100 cm depth, scientists have found that 4 °C of warming could result in soil releasing as much as 37 percent more CO_2 than normal; https://news.climate.columbia.edu/2018/02/21/can-soil-help-combat-climate-change/ (Last access: 22 June 2022).

[31] McCool and Williams (2008); https://www.sciencedirect.com/referencework/9780080454054/encyclopedia-of-ecology (Last access: 22 June 2022); Erodibility is defined as the vulnerability or susceptibility of the soil to erosion. It is a function of both the physical characteristics of the soil and the land management practices. For a given rainfall condition, one soil condition can be compared quantitatively with the other.

[32] Ibid. IPCC SPM (2021) -25; Monsoon precipitation is projected to increase in the mid- to long term at global scale, particularly over South and Southeast Asia, East Asia and West Africa apart from the far west Sahel. The monsoon season is projected to have a delayed onset over North and South America and West Africa and a delayed retreat over West Africa.

2.3 Food Security

Agriculture, and the wider food production system, is a major source of the gases which contribute to the greenhouse effect and climate change. However, the changing climate is having far-reaching impacts on soil productivity and agricultural production, which are likely to challenge food security in the future.[33] Climate change will contribute substantially to food insecurity by increasing food prices, and reducing food production. Food may become more expensive as climate change mitigation efforts increase energy prices. Water required for food production may become scarce due to increased crop water use and drought. Competition for land may increase as certain areas become climatically unsuitable for production. The consensus of the IPCC is that substantial climate change has already occurred since the 1950s, and it is likely that the global mean surface air temperature will increase by 0.4 to 2.6 °C in the second half of this century, depending on future GHG emissions. Future intensification of agriculture to compensate for reduced production, partly caused by climate change, alongside an increasing demand for animal products, could further increase these emissions.[34]

While gradual increases in temperature and CO_2 may result in more favourable conditions that could increase the yields of some crops, in some regions, these potential yield increases are likely to be restricted by extreme events. Crop production is projected to decrease in many areas during the twenty-first century because of climatic changes. This is illustrated in an IPCC figure which summarises average crop yield projections across all emission scenarios, regions, and with, or without adaptation by farmers, showing an increasing trend towards widespread yield decreases.[35] Periods of extreme high temperature are likely to become more frequent in the future and represent a major challenge for agriculture and food production. Heat waves can cause heat stress in both animals and plants and have a negative impact on food production. Evidence for an increase in heat waves exists from warming that has already occurred, and greater than expected increases in heat wave frequency and magnitude.[36] The impact of heat waves is expected to be non-uniform, and together with other aspects of climate change such as increased drought incidence, they may exacerbate existing issues around food security.

[33] https://www.futurelearn.com/info/courses/climate-smart-agriculture/0/steps/26565 (Last access: 22 June 2022).

[34] See Farmers for Climate Action (2021) Fig. 1 at 6, "Through the deliberate and coordinated application of high-impact carbon abatement initiatives, we have modelled a pathway to mitigate on-farm emissions from Australian agriculture. The pathway modelled is bound by trajectories that are likely to limit global warming to 1.5°C and 2°C by 2100 and would see agriculture reach the equivalent of net zero emissions by 2040"; https://farmersforclimateaction.org.au/wp-content/uploads/2021/09/FCA-EY-FINAL-Report-Low-emissions-future (accessed 27 October 2021).

[35] See figure Ibid. IPCC SPM (2021) -16.

[36] See figure Ibid. IPCC SPM (2021) -16.

3 Climate Litigation

Recent decisions in Australian and in overseas jurisdictions highlight numerous legal and human-related issues related to climate change, i.e., "climate litigation", including: harm to the natural and ecological environment, intergenerational harm to children of the current generation who are affected by decisions made today that affect the climate; obligation of statutory authorities to invoke the duty that they have to climate management under respective statutes; the importance of clarity of meaning of key words and phrases in environmental statutes; the need to take into account the latest scientific information of the IPCC in decision-making; the effect of climate change on food supply, loss of territory and habitable areas, endangering health, and the human right to a climate system to sustain human life. The term 'climate litigation' is now generally used to refer to legal proceedings initiated to establish responsibility for a failure to prevent or reduce the rate of climate change and/or mitigate its negative consequences.[37] The arguments presented in the litigation make important progress in society's acceptance of the significance of climate change in the long term protection of the soil environment. Most importantly for soil is the role that climate science should play in expert evidence in litigation where climate change is the legal challenge that affects the soil environment in particular.

Five cases are briefly discussed in this chapter that depict various human-related and legal issues related to climate change. However, once case in particular, BSCA v EPA is examined in detail. Although this case concerns climate change in NSW, it contains many legal points, rules and principles that are relevant for assessing and developing legislation to protect the soil environment from climate change in other Australian jurisdictions and in other countries. Other reasons for its examination include: (1) by interpretation, "soil" is a component of the "environment" under the POEA Act[38] and following the argument of BSCA v EPA it should be protected from climate change under the POEA Act; (2) the decision provides a guiding framework which could be used to examine existing environmental laws for protection of the soil environment against climate change; and (3) it provides a guiding framework to help prepare new soil legislation so that it can develop environmental quality objectives, guidelines and policies to ensure protection of the soil environment from climate change. The BSCA v EPA proceedings are the second successful

[37] Ibid. Preston (2018), p. 132.

[38] "Soil" is not defined in the NSW Soil Conservation Act 1938, but s 4C "Powers, duties and authorities of the Commissioner", has the "aim of ensuring the conservation of the soil resources of the State, the mitigation of soil erosion and land degradation and the conservation of water resources . . ."; and a further power under 4C (c) is for "the evaluation of the present condition of the State's soil resources, and the future requirements for the mitigation of soil erosion and land degradation". The POEA Act 1991, more broadly, under s 3(1) defines the "environment" as meaning "components of the earth, including: (a) land, air and water, and (b) any layer of the atmosphere, and (c) any organic or inorganic matter and any living organism, and (d) human-made or modified structures and areas, and includes interacting natural ecosystems that include components referred to in paragraphs (a)–(c)."

action brought in 2021 in NSW (after the Gloucester decision, below) resulting in a finding that a public decision maker has a duty to consider, address and mitigate climate change. In conjunction with the determination in the Sharma case, this case highlights that the NSW and Commonwealth Governments, and public agencies, are likely to continue to be pressed by the courts to step up the policy framework, assessment and consideration of the impacts arising from climate change.

3.1 Gloucester Resources Limited v Minister for Planning *2019 (Gloucester Decision)*

In February 2019 the New South Wales Land and Environment Court refused consent to a development application for a coal mining project for reasons relating to environmental and social harm, but specifically that the project will be a material source of GHG emissions and contribute to climate change.[39] The Gloucester decision stated that acceptability of a proposed development of a natural resource depends not on the location of the natural resource, but on its sustainability. One of the principles of ecologically sustainable development is the principle of sustainable use, the aim of exploiting natural resources in a manner that is "sustainable" or "prudent" or "rational" or "wise" or "appropriate".[40] This principle also has an ecological core: that the use of natural resources must be within ecological limits. It was ruled that "Approval of the project will not assist in achieving the rapid and deep reductions in GHG emissions that are needed now in order to balance emissions by sources with removals by sinks of GHGs in the second half of this century and achieve the generally agreed goal of limiting the increase in global average temperature to well below 2 °C above pre-industrial levels".[41]

[39] Gloucester Resources Limited v Minister for Planning [2019] NSWLEC 7; https://www.caselaw.nsw.gov.au/decision/5c59012ce4b02a5a800be47f (accessed 7 October 2021).

[40] As determined by the NSW LEC in *Telstra Corporation Limited v Hornsby Shire Council* [2006] (2006) 146 LGERA 10); the decision of Justice Preston in Telstra provides a comprehensive analysis of the precautionary principle in a judicial context. It contains clear guidance to decision makers on when and how the precautionary principle is to be applied when there is a statutory obligation to have regard to the principles of Ecologically Sustainable Development (ESD).

[41] Ibid. para 697.

3.2 *Sharma by Her Litigation Representative Sister Marie Brigid Arthur v Minister for the Environment 2021 (Sharma Decision)*

In May 2021, in the first decision of its kind in Australia, the Federal Court of Australia ruled that the Minister for Environment, and the government, has a duty of care to protect Australia's youth from the climate crisis.[42] In Sharma, the applicants claimed that the Minister owes each of the children a duty to exercise her power under ss 130 and 133 of the Environment Protection and Biodiversity Conservation Act 1991 with reasonable care so as not to cause them harm. That duty of care is said to arise by reason of the existence of a legal relationship between the Minister and the "Children" recognised by the law of negligence.[43] The particular harm relevant to the alleged duty of care is mental or physical injury, including ill-health or death, as well as economic and property loss. The applicants in Sharma assert that the *Children* are likely to suffer those injuries in the future as a consequence of their likely exposure to climatic hazards brought about by increasing global surface temperatures that are driven by the further emission of CO_2 into the Earth's atmosphere. The feared climatic hazards include longer and more intense bushfires, storm surges, coastal flooding, inland flooding, cyclones and other extreme weather events.[44]

The applicants alleged that such harm will occur in the future and mainly towards the end of this century, when global average surface temperatures are forecast to be significantly higher than they are currently. The applicants said that today's children will live on Earth during a period in which, if CO_2 concentration continues to increase, some harm is very probable, serious harm is likely and cataclysmal harm is possible. On this basis, the applicants say that the Children are vulnerable to a known, foreseeable risk of serious harm. The applicants maintained that by the Minister's position in the Commonwealth Executive, the Minister has special responsibilities to Australian children[45] and that if the Minister approves the project, carbon presently stored safely underground at the site of the project will be extracted, combusted and emitted as CO_2 into the Earth's atmosphere and will materially contribute to CO_2 concentration.[46]

[42] Sharma v Minister for the Environment [2021] FCA 560; https://www.judgments.fedcourt.gov.au/judgments/Judgments/fca/single/2021/2021fca0560 (Last access: 22 June 2022); At the time of writing, the decision in *Sharma* is on appeal to the Full Federal Court.

[43] Ibid. para 9.

[44] Ibid. para 11.

[45] Ibid. para 12.

[46] Ibid. para 13.

3.3 Dutch Climate Case

In December 2019, the Dutch Supreme Court, the highest court in the Netherlands, upheld the previous decisions in the Urgenda Climate Case, finding that the Dutch government has obligations to urgently and significantly reduce emissions in line with its human rights obligations.[47] It was the first case in the world in which citizens established that their government has a legal duty to prevent dangerous climate change. On 24 June 2015, the District Court of The Hague had ruled that the government must cut its greenhouse emissions by at least 25% by the end of 2020 (compared with 1990 levels). The ruling required the government to immediately take more effective action on climate change.[48] The court considered that given the severity of the impact from climate change and the significant chance that unless mitigating measures are taken, dangerous climate change will occur. It was ruled that the State has a duty of care to take mitigating measures. It was also ruled that this duty is not diminished by the fact that the Dutch contribution to the present global greenhouse emissions is currently quite minor. Given that at least the 450 ppm scenario is required to prevent hazardous climate change, the Netherlands should take measures to ensure this scenario can be achieved.[49]

In the appeal case it was stated that:

> The emissions of greenhouse gases, which are the partial result of burning of fossil fuels and the resultant release of the greenhouse gas CO_2, is leading to an ever higher concentration of those gases in the atmosphere. This is warming the planet, which is resulting in a variety of hazardous consequences. This may result in local areas of extreme drought, extreme precipitation, or other extreme weather. It is also causing both glacial ice and the ice in and near the polar regions to melt which is raising the sea level. Some of these consequences are already happening right now. That warming may also result in tipping points, as a result of which the climate on earth or in particular regions of earth changes abruptly and comprehensively. This will result in, among other things, the significant erosion of ecosystems which will, for example, jeopardise the food supply, result in the loss of territory and habitable areas, endanger health, and cost human lives.[50]

3.4 Ireland and Pakistan Cases

These two cases are relevant to the environmental protection of soil as they delineate the basic rights of citizens to a healthy environment in particular as a constitutional right. In *Friends of the Irish Environment CLG v the Government of Ireland, and the Attorney General* [2020] IESCDET 13), the focus was on whether the Irish

[47] See also Spijkers (2022), p. 239.

[48] ECLI:NL:HR:2019:2007 (English translation); https://www.urgenda.nl/wp-content/uploads/ENG-Dutch-Supreme-Court-Urgenda-v-Netherlands-20-12-2019.pdf (Last access: 22 June 2022).

[49] Ibid. para 2.3.1.

[50] Ibid. para 4.1.

Government had acted unlawfully and in breach of specified rights in the manner in which it has adopted a statutory plan (the National Mitigation Plan (hereafter, NMP)) for tackling climate change. The High Court dismissed Friends of the Irish Environment's (FIE) proceedings and FIE appealed to the Court of Appeal.[51] The FIE contended that the government, in regard to the NMP, had failed adequately to vindicate rights which are said to be guaranteed by either or both of the Constitution and the European Convention on Human Rights.[52] Significantly, both the applicant and the respondents accepted that a degree of urgency existed in respect of the adoption of remedial environmental measures, and there was no dispute between the parties as to the science underpinning the NMP and the likely increase in greenhouse emissions over the lifetime of the NMP.[53] Further, the parties accepted the gravity of the likely effects of climate change.[54] The judge concluded that the NMP falls well short of the level of specificity required to provide that transparency and to comply with the provisions of the Climate Action and Low Carbon Development Act, 2015. On this basis, the NMP should be quashed.[55] On the question of a right of citizens to a healthy environment under the Constitution, the judge did not rule out the possibility that constitutional rights and obligations may well be engaged in the environmental field in an appropriate case. In this case, the judge expressed the view that the asserted right to a healthy environment is either superfluous (if it does not extend beyond the right to life and the right to bodily integrity) or is excessively vague and ill-defined (if it does go beyond those rights). The judge's view was that such a right cannot be derived from the Constitution and reserved the position of whether, and if in what form, constitutional rights and state obligations may be relevant in environmental litigation to a case in which those issues would prove crucial.[56]

In the Pakistan case, *Asghar Leghari v Federation of Pakistan*,[57] the petitioner, who is an agriculturist, approached the Court as a citizen for the enforcement of his fundamental rights. He submitted that the overwhelming majority of scientists, experts, and professional scientific organizations related to earth sciences agree that there is sufficient evidence that climate change is real. He also submitted that no one can deny the devastating impact of the increase in frequency and intensity of climate extremes, and that the view of most of the experts is that the major cause is human activities. These, he submitted, include a complex interaction with the natural

[51] Appeal No 205/19; Friends of the Irish Environment CLG Applicants/Appellants and The Government of Ireland, Ireland and the Attorney General Respondents, Judgment of Mr. Justice Clarke, Chief Justice, delivered the 31st of July 2020.

[52] Ibid. para 1.2.

[53] The National Mitigation Plan was adopted under the provisions of the Climate Action and Low Carbon Development Act 2015.

[54] Ibid. para 2.1; an overview of the climate science is provided in cl. 3, at 4–8.

[55] Ibid. para 9.3.

[56] Ibid. para 9.5.

[57] Stereo. H C J D A 38. Judgment Sheet in the Lahore High Court, Lahore Judicial Department Case No: W.P. No. 25501/2015; (accessed 13 October 2021).

environment coupled with social and economic changes that are increasing the greenhouse gases in the atmosphere, which are resulting in the increase of global temperature and in turn causing climate change.[58] In order to address the threat of climate change, the National Climate Change Policy 2012 and the Framework for Implementation of Climate Change Policy (2014–2030) had been formulated by the Pakistan Ministry of Climate Change, but no implementation had taken place on the ground.[59] The petitioner feared that in the absence of any strategy by the Government to conserve water or to covert to heat-resilient crops, he would not be able to sustain his livelihood, as a result of climate change. He also submitted that inaction on the part of the government in not implementing the Framework offended his fundamental rights, in particular, Articles 9 and 14 of the Constitution, besides the constitutional principles of social and economic justice. He further submitted that international environmental principles like the doctrine of public trust, sustainable development, the precautionary principle and intergenerational equity, form part of the fundamental rights under the Constitution.[60] The court took into consideration the National Climate Change Policy 2010, the Framework for Implementation of Climate Change Policy (2014–2030), the role of the Climate Change Commission (instituted in 2015), the Pakistan Climate Change Act 2017, and the concepts of environmental justice and climate justice. The Climate Change Commission was dissolved by the court and replaced by a Standing Committee on Climate Change to act as a link between the court and the Executive and to render assistance to the government and agencies in order to ensure that the Policy and the Framework continue to be implemented.[61] The judge concluded the proceedings by not disposing of the petition, but instead, consigning it to the record, so that the Standing Committee could approach the Court for an appropriate order for the enforcement of the fundamental rights of the people in the context of climate change, if and when required.[62]

4 *Bushfire Survivors for Climate Action Incorporated v Environment Protection Authority*

In Bushfire Survivors for Climate Action Incorporated v Environment Protection Authority (hereafter, BSCA v EPA) the duty on the Environment Protection Authority (EPA) in relation to climate change is imposed by s 9(1)(a) of the Protection of the Environment Administration Act 1991 (POEA Act). This section requires the EPA to "develop environmental quality objectives, guidelines and policies to ensure

[58] Ibid. para 2.
[59] Ibid. para 3.
[60] Ibid. para 3.
[61] Ibid. para 25.
[62] Ibid. para 27.

environment protection." The BSCA's primary argument was that the purpose of environment protection includes protection of the environment from significant threats. In this case, the most significant threat being an "existential" and "grave" threat—is climate change. The environmental quality objectives, guidelines and policies to ensure environment protection that the EPA is required to develop under s 9(1)(a) should therefore include instruments of this kind to protect the environment in NSW from this threat of climate change - as a specific duty. The case contends that the duty requires developing not only instruments to ensure protection of the environment from climate change as a general proposition, but more particularly to do so in ways that are "consistent with limiting global temperature rise to 1.5 degrees Celsius above pre-industrial levels." The outcome of the case was that the EPA, in accordance with s 9(1)(a), is to develop environmental quality objectives, guidelines and policies to ensure environment protection from climate change.

4.1 EPA Duty with Respect to Soil

Two key aspects to improve the protection of the soil environment from the effects of climate change include authorities properly implementing their duty under environmental legislation, and improving the legislation for soil to ensure it contains the procedures that will protect it.[63] In this regard, the BSCA v EPA decision in the NSW LEC, as well as decisions from other climate change cases, can provide useful guidelines that may lead to improved legislative capability to protect the soil environment of NSW, and possibly other areas of the world, against climate change. The extent to which the soil environment should be considered in statutory action is evident by examining the BFCA v EPA decision. The court ordered that "the Environment Protection Authority in accordance with s 9(1) (a) of the Protection of the Environment Administration Act 1991 (NSW) is to develop environmental quality objectives, guidelines and policies to ensure environment protection from climate change." Significantly for soil, in an analysis of the causes and consequences of climate change, and conclusion concerning the severity of the threat to the environment and people of NSW posed by climate change, these findings were not contested by the EPA. Moreover, the EPA and BSCA agreed on a statement of 46 facts regarding the causes and consequences of climate change.[64] Each agreed fact is synonymous with various climate change impacts and, as argued below, many of these impacts are synonymous with specific impacts on the soil environment.[65]

[63] Various publications provide direction as to how these objectives can generally be met; Hannam and Boer (2002, 2004) and Boer and Hannam (2015).

[64] Bushfire Survivors for Climate Action Incorporated v Environment Protection Authority [2021] NSWLEC 92 (Preston CJ) the Court ordered on 26 August 2021, para. 76.

[65] The data matrix on specific impact on soil environment of each agreed fact is held by the author.

4.2 POEA Act 1991 and Soil

While the POEA Act 1991 does not explicitly refer to "soil", under the definition of "the environment," the following discussion argues that "soil" would fall within the meaning of "environment" under the Act. In NSW, "soil" generally falls within the jurisdiction of the Soil Conservation Act 1938 (SCA),[66] but it is argued that the definitions of "environment" and "environmental protection" under the POEA Act could be applied, more appropriately, to protect the soil environment of NSW from climate change. This interpretation is made in particular since the BSCA v EPA decision. This view is based on the fact that the SCA has remained relatively unchanged since its introduction in 1938 and does not feature the specific legal procedures to protect soil against such significant environmental issues of this era such as the effect on climate change from soil mismanagement and the role that soil should play in protection of the environment against climate change.[67] In this context, this chapter argues, on the basis of the objects of the POEA Act and the General Responsibilities of the Environment Protection Authority, that the POEA Act is the more appropriate legislation to establish the primary environmental quality objectives, guidelines and policies to ensure protection of the soil environment from climate change than the SCA.

It is argued that the broad scope of the objects of the POEA Act makes it more appropriate than the general provisions of the SCA to protect the soil environment of NSW. The objects of the POEA Act are:[68] (a) to constitute the Environment Protection Authority, (b) to provide integrated administration for environment protection, and (c) to require the Authority to perform particular tasks in relation to the quality of the environment, environmental audit and reports on the state of the environment. The EPA has a General Responsibility for:[69] (a) ensuring that the best practicable measures are taken for environment protection in accordance with the environment protection legislation and other legislation, (b) co-ordinating the activities of all public authorities in respect of those measures, (c) inquiring into and reporting on the efficacy of those measures, (d) reviewing the regulatory framework for environment protection and advising on its rationalisation and simplification, (e) investigating and reporting on alleged non-compliance with environment protection legislation for the purposes of prosecutions or other regulatory action, (f) establishing a database on the state of the environment, (g) advising persons engaged in industry and commerce and other members of the community on

[66] The long title of the Act is "An Act to make provision for the conservation of soil resources and farm water resources and for the mitigation of erosion".

[67] Hannam (1993) argues that the soil conservation policy and law for New South Wales is no longer adequate to manage the environmental issues that affect the ecological aspects of soil; see also Hannam and Boer (2004), p. 5, 1.2 "What is wrong with the national legislation in many jurisdictions?"

[68] Ibid. POEA Act 1991 s 4 (a)–(c).

[69] Ibid. POEA Act 1991 s 7 (2) (a)–(h).

environment protection, and (h) advising the Government on methods to ensure the integration of the Authority's pollution approvals and licensing processes with the development consent process so that the importance of environment protection is recognised.

4.3 Significant Principles from the BSCA v EPA Case

To properly establish the argument that "soil" falls within the purview of the POEA Act, in respect of climate change, firstly requires satisfaction that "soil" falls within the meaning of "environment" under the Act, and secondly that soil should be subject to "protection of the environment," from climate change.

4.3.1 Soil as a Component of "Environment"

With regard to being satisfied that "soil" is a component of the environment, under the POEA Act, this relies on at least three things: an understanding of the meaning of "environment": being satisfied that soil is a component of the meaning of "land" in the definition of environment; and being satisfied that "soil" should be protected within the meaning of the "protection of the environment."

4.3.2 Environment

In s 3(1) of the POEA Act "environment" means "components of the earth, including: (a) land, air and water, and (b) any layer of the atmosphere, and (c) any organic or inorganic matter and any living organism, and (d) human-made or modified structures and areas, and includes interacting natural ecosystems that include components referred to in paragraphs (a)–(c)." With this in light, referring back to the definition of "soil" earlier, where "soil has a fundamental role in the terrestrial ecosystem, as a three dimensional body performing a wide range of ecological functions,"[70] then this would satisfy that soil is a "component of the earth" and is an "interacting natural ecosystem[s]' under s 3(1)(d) of POEA Act.

4.3.3 Land

Although the definition of "environment" in the POEA Act does not specifically mention "soil", the reference to "land" in this definition would satisfy the definition of "land" in the UNCCD where it is taken to "include the terrestrial bio-productive

[70] Ibid. Sheals (1969).

system that comprises soil, vegetation, other biota, and the ecological and hydrological processes that operate within the system".[71] This definition supports the fact that "soil" has a fundamental role in the terrestrial ecosystem, performing a wide range of ecological functions.[72] The alteration of soil processes leads to changes in the function of ecosystems, and many environmental problems that become apparent in other media[73] originate from changes in the physical and chemical processes within soil as a direct result of external actions and disturbances such as, bushfires, bulldozing, over-grazing, and unsustainable cultivation practices, for example.

4.3.4 Environment Protection

Under the POEA Act, "environment protection" is defined as "anything which furthers the objectives of the Authority as set out in section 6," of the POEA Act , where s 6(1) specifies that "the objectives of the Authority are: (a) to protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development, and (b) to reduce the risks to human health and prevent the degradation of the environment". Again, referring back to the definition of "soil", soil would be encapsulated both within s 6(1)(a) in regard to protecting, restoring and enhancing the quality of the environment, including the need to maintain ecologically sustainable development, and in s 6(1)(b) in regard to reducing the risks to health (e.g., a reduction in air quality by wind borne dust particles from degraded land), and preventing the degradation of the environment (e.g., soil erosion causing a loss of valuable top soil, and stream sedimentation from soil erosion).

4.3.5 Ecologically Sustainable Development

The concept of ecologically sustainable development (ESD) is critical for the protection of the soil environment.[74] Given that the definition of ESD encompasses

[71] Definition of "land" in Article 1(e) of the UN Convention to Combat Desertification (1994).

[72] Ibid. Sheals (1969).

[73] E.g., POEA Act s 3(1)(a) air and water; (b) the atmosphere; (c) loss of soil organic matter, loss of nutrients for plants and micro-organisms.

[74] ESD is a long-standing and internationally recognised concept. The concept has been affirmed by the 2002 World Summit for Sustainable Development and has been included in over 60 pieces of NSW legislation. *Australia's National Strategy for Ecologically Sustainable Development (1992)* defines ecologically sustainable development as: 'using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.' ESD is also defined in the *Protection of the Environment Administration Act 1991* (NSW) and s 3A of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) sets out the "Principles of ecologically sustainable development"; ESD is referred to in many other environmental laws in Australia.

"using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased,"[75] then the protection of soil is an essential activity for these conditions to be met. And further, as s 6(1)(a) of the POEA Act specifies, the objectives of the EPA are "to protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development," then, under these circumstances, it would seem apparent that the EPA has a primary responsibility to protect the soil environment. The concept of ESD is defined under s 6(2), where, for the purposes of s 6(1), "ecologically sustainable development requires the effective integration of social, economic and environmental considerations in decision-making processes."

The POEA Act specifies that ESD can be achieved through the implementation of three important principles; (a) the precautionary principle;[76] (b) inter-generational equity;[77] and (c) conservation of biological diversity and ecological integrity.[78] In this context, the provision for an ecologically sustainable approach within legislation to protect the soil environment has been extensively argued for some time.[79] Boer and Hannam (2015) specify that in relation to the drafting of law and policy for soil " [I]in current debates, this involves a consideration of the 'environmental rule of law. This means developing robust legal mechanisms that enable an ecosystem-based approach to be applied in all aspects of soil protection. The ecosystem approach takes into account the relationship between soil bodies as living ecological communities and the broader environmental and landscape context. An effective environmental rule of law that promotes soil sustainability will therefore depend on the selection of appropriate ecological concepts and the development of a legal structure with the right elements to implement these concepts."[80]

[75] *Australia's National Strategy for Ecologically Sustainable Development (1992).*

[76] POEA Act 1991 s 6 (2)—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by: (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and (ii) an assessment of the risk-weighted consequences of various options.

[77] POEA Act 1991 s 6 (2)—namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

[78] POEA Act 1991 s 6 (2)—namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.

[79] Hannam and Boer (2002), pp. 17–23; Hannam and Boer (2004), pp. 11–12; Boer and Hannam (2015), p. 6.

[80] Boer and Hannam (2015), p. 6.

4.4 Duty Under the Law

In BSCA v EPA it is emphasized that the nature and scope of the duty imposed on the EPA is by s 9(1)(a) of the POEA Act and the decision specified that any discretion to perform the duty, are to be construed by reference to both the context and purpose of s 9(1)(a). It was pointed out that where the Court is undertaking judicial review of administrative action, the task of statutory construction is "to ensure that those possessed of executive and administrative powers exercise them only in accordance with the laws which govern their exercise. The rule of law requires no less".[81] This section requires the EPA to perform two important tasks in relation to the quality of the environment: first, to develop certain instruments to ensure environment protection and, secondly, to monitor the state of the environment for the purpose of assessing trends and the achievement of the instruments it has developed.[82] Specifically, it provides that: "The Authority is required to: (a) develop environmental quality objectives, guidelines and policies to ensure environment protection,[83] and (b) monitor the state of the environment for the purpose of assessing trends and the achievement of environmental quality objectives, guidelines, policies and standards." The judge pointed out that what this implies is that the environmental quality objectives, guidelines and policies developed under s 9(1)(a) must be of a certain character and purpose, i.e., that of relating to "environmental quality". Section 9(2) requires the EPA to develop a comprehensive scheme of environmental audit with respect to industry, commerce and public authorities.[84]

On the basis that "soil" is a component of the "environment" under the POEA Act it logically follows that the EPA has a duty to prepare instruments for the protection of the soil environment in relation to climate change in NSW. The procedural rule here concerning national soil legislation in other countries of the world is to ensure that instruments are drafted in a manner that ensure the accountability of the responsible statutory authority.[85]

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[81] Ibid. [2021] NSWLEC 92 para 20.

[82] Ibid. [2021] NSWLEC 92 para 24.

[83] Ibid. [2021] NSWLEC 92 para 30 specifies that if an objective, a guideline or a policy are not specifically defined, then the ordinary meaning of those terms would apply.

[84] In BSCA v EPA, the rule was made clear in that the administrative function the subject of judicial review is a duty not a power and the focus of the review was on the performance or non-performance of the duty. What came into question were the action that the duty requires to be taken, and the legal effect that is given to that action by the statute. An administrative decision or action only has such force and effect as is given to it by the statute pursuant to which it was made or taken. The action taken in accordance with a statutory provision imposing a duty will have the legal effect given to that action by the statute. But action taken otherwise than in accordance with the statutory provision imposing the duty will not have legal effect or consequence under the statute.

[85] See Hannam and Boer (2004) Part IV, Elements for drafting national soil legislation.

4.5 The Character of Environment Quality

The BSCA v EPA case notes that the objectives, guidelines and policies developed under s 9(1)(a) must be of a certain character, that of relating to "environmental quality".[86] As noted, s 9(1) is the source of the requirement on the EPA to perform the particular tasks stated in the subsection "in relation to the quality of the environment", which is the third object of the POEA Act in s 4. Although the expressions, "environmental quality" or "the quality of the environment" are not defined in the POEA Act, the word "environment" has been defined. As discussed above, although the meaning of environment does not specifically mention "soil", the reference to "land" in s 3(1)(a) is taken to include the terrestrial bio-productive system that comprises soil, vegetation, other biota, and the ecological and hydrological processes that operate within the system.[87] This position is further reinforced in BSCA v EPA where it is stated that "environmental quality or the quality of the environment, therefore, refers to the quality of these components of the earth, including interacting natural ecosystems that include the components referred to in paragraphs (a) to (c) of s 3(1)."[88]

4.6 The Purpose to Ensure Environment Protection

The BSCA v EPA case specifies that a duty under s 9(1)(a) is to develop objectives, guidelines and policies not only of a particular character, being of "environmental quality", but also for a particular purpose, "to ensure environment protection". The decision points out that this phrase, "to ensure environment protection", is normative, in that it establishes an evaluative standard or norm for the objectives, guidelines and policies. There are two components: the action "to ensure", and the object of the action, which is "environment protection".[89] In this regard, the object of the action, "environment protection," is defined in s 3(1) of the POEA Act to include "anything which furthers the objectives of the Authority as set out in s 6 (the Objectives of the EPA)".[90] The first objective of the EPA, therefore, is for the EPA to "take action to protect, restore and enhance the quality of the environment in New South Wales in ways that are consistent with achieving and maintaining ecologically sustainable development". The second objective of the EPA in s 6(1) is "to reduce the risks to human health and prevent the degradation of the environment" by various means.[91]

[86] Ibid. [2021] NSWLEC 92 para 35.
[87] Supra, definition of "land" in Article 1(e) of the Convention to Combat Desertification.
[88] Ibid. [2021] NSWLEC 92 para 36.
[89] Ibid. [2021] NSWLEC 92 para 38.
[90] Ibid. [2021] NSWLEC 92 para 40.
[91] Ibid. [2021] NSWLEC 92 para 42.

It is argued in this chapter that various aspects of the objective of the EPA in s 6(1)(b), in the context of climate change, are highly relevant to soil protection in NSW by: "adopting the principle of reducing to harmless levels the discharge into the air, water or land of substances likely to cause harm to the environment; adopting minimum environmental standards prescribed by complementary Commonwealth and State legislation and advising the Government to prescribe more stringent standards where appropriate; setting mandatory targets for environmental improvement; promoting community involvement in decisions about environmental matters; and conducting public education and awareness programs about environmental matters."[92] Whilst these actions would clearly apply to protect "soil" in NSW, they are the types of rules that could apply when any jurisdiction is drafting soil legislation. However, meaning of such activities must be clearly expressed as well as the procedures for statutory authorities and in a manner such that can be successfully and practically applied.[93]

4.7 Discretion in Performing the Duty

There are two other points from BSCA v EPA relating to a duty to the protection of the NSW soil environment. The first point is that there is no discretion as to whether any environmental quality objectives, guidelines and policies to ensure environment protection need to be developed because there is a duty on the EPA to do so. The second point is that there is no discretion as to why environmental quality objectives, guidelines and policies need to be developed because the duty requires such instruments to be developed to ensure environment protection.[94] However, "there are controls on the discretion afforded to the EPA in its performance of the duty" and "[T]thus, a document that does not answer the statutory description of "objectives, guidelines and policies", with the character of "environmental quality" and for the purpose "to ensure environment protection" will have no legal effect or consequence under s 9(1)(a)."[95] The second point is that "the objectives and functions of the EPA vest it with expert administrative competence in environment protection. Section 9 (1) seeks to employ this expert administrative competence by imposing on the EPA the duty to develop environmental quality objectives, guidelines and policies to ensure environment protection. This requirement for expert administrative competence is a positive control on the discretion to perform the duty in s 9(1)(a). The discernible legislative intention is that the discretion to perform the duty is less likely

[92] Ibid. [2021] NSWLEC 92 para 45.

[93] See Hannam and Boer (2004), Part IV, Elements for drafting national soil legislation.

[94] Ibid. [2021] NSWLEC 92 para 48.

[95] Ibid. [2021] NSWLEC 92 para 51.

to be abused if it is exercised by a public authority who has expertise in environment protection."[96]

4.8 *Establishing Protection of the Soil Environment from Climate Change*

A key aspect of the BSCA v EPA decision for protecting the soil environment from climate change is the discussion on the appropriateness of instruments to protect the environment and that the type of instruments required will vary over time. The duty under s 9(1)(a) to develop environmental quality objectives, guidelines and policies "to ensure environment protection" includes a duty to develop these instruments to ensure environment protection from climate change.[97] It was submitted by BSCA that "environment protection" necessarily includes protection of the environment in NSW from climate change. This follows from the meaning of "environment protection" in s 3(1) of the POEA Act. Actions to protect the environment in NSW from climate change meet the description of being anything which furthers the objectives of the EPA as set out in s 6(1). Such actions further the first objective "to protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development". The environment is defined to include the "air" and "any layer of the atmosphere", both of which are adversely affected by climate change caused by the anthropogenic emissions of greenhouse gases.[98]

In this regard, the IPCC 2021 AR6 has clearly established that the emission of greenhouse gases is a grave threat to the atmosphere and climate systems.[99] In BSCA v EPA it is stated that "The atmosphere and climate systems interact with, support, and impact on other components of the earth and its natural ecosystems, including land, air and water; organic or inorganic matter and any living organism; and human-made or modified structures and areas. Protection of the environment against the threat of greenhouse gas emissions must entail mitigation of the sources of greenhouse gas emissions; adaptation to climate change is insufficient as it is not directed to protection of the atmosphere. Protection of the environment from climate change implements the principles of ecologically sustainable development, including the precautionary principle, intergenerational equity, conservation of biological

[96] Ibid. [2021] NSWLEC 92 para 53.

[97] Ibid. [2021] NSWLEC 92 para 60.

[98] Ibid. [2021] NSWLEC 92 para 61.

[99] Ibid. SPM-5, A1.1 "Observed increases in well-mixed greenhouse gas (GHG) concentrations since around 1750 are unequivocally caused by human activities. Since 2011 (measurements reported in AR5), concentrations have continued to increase in the atmosphere, reaching annual averages of 410 ppm for carbon dioxide (CO_2), 1866 ppb for methane (CH_4), and 332 ppb for nitrous oxide (N_2O) in 2019".

diversity and ecological integrity, and the polluter pays principle, thereby enabling the achievement and maintenance of ecologically sustainable development: *Gloucester Resources Ltd v Minister for Planning* (2019) 234 LGERA 257; [2019] NSWLEC 7 at [488], [498]."[100]

The role of up-to-date knowledge of climate threats in exercising a duty appear in the BSCA v EPA case where it is stated that actions to protect the environment from climate change also further the second objective of the EPA in s 6(1) "to reduce the risks to human health and prevent the degradation of the environment" by means such as those specified in s 6(1)(b).[101] In this regard, the judge opined that the threats to the environment, against which environmental quality objectives, guidelines and policies need to be developed to protect the environment, will change over time and place and in magnitude and impact. Under the circumstances, the environmental quality objectives, guidelines and policies to ensure environment protection will need to change in response to the threats to the environment that prevail and are pressing at the time.[102] What is required to perform the duty in s 9(1)(a), therefore, will vary over time and place in response to the changes in the threats to the environment. This may make it difficult to describe definitively what the duty requires at any particular time or place, because it requires identification of the current threats to the environment. It was stated that it should always be possible to identify the current threats that are of greater magnitude and greater impact. This means that, at a minimum, the duty under s 9(1)(a) will require progressive development of environmental quality objectives, guidelines and policies to ensure the protection of the soil environment from threats of greater magnitude and greater impact.[103]

The IPCC AR6 report is clear in its summation that, at the current time, the threat to the environment by climate change is of sufficient magnitude and impact that urgent protection is required. Thus, the duty in s 9(1)(a) to develop environmental quality objectives, guidelines and policies to ensure environment protection requires the development of such instruments to ensure environment protection from climate change.[104] In this regard, for Australia, a number of recent individual extreme events have been directly linked to climate change, including for example the 2019–2020 bushfires.[105] Further, a number of elements of "Unabated anthropogenic climate change" referred to in the BSCA v EPA case that are a useful framework in which to consider the climate change impacts resulting from soil mismanagement include:[106]

[100] Ibid. [2021] NSWLEC 92 para 61.

[101] Ibid. [2021] NSWLEC 92 para 62.

[102] Ibid. [2021] NSWLEC 92 para 66.

[103] Ibid. [2021] NSWLEC 92 para 68.

[104] Ibid. [2021] NSWLEC 92 para 69.

[105] See Pickrell (2021), pp. 1–13.

[106] From Summary in Sackett Fourth Report of 10 August 2021, as quoted in [2021] NSWLEC 92 para 75.

a) Fundamental - affecting basic aspects of the physical Earth system, and the ecosystems that depend on it,
b) Global - greenhouse gases emitted anywhere in the world affect the whole globe,
c) Comprehensively Dangerous - with the potential to disrupt/destroy every ecosystem,
d) Rapid - occurring at a speed that precludes many organisms and even whole ecosystems from adapting,
e) Inertial - with a delayed response to emissions that "locks in" some measure of climate change that is greater than that currently experienced,
f) Compounding - the effects of climate change can occur simultaneously, greatly increasing the negative consequences of extreme events,
g) Irreversible - feedbacks in the Earth System have the potential to irreversibly change ecosystems and processes in the Earth system.[107]

4.9 Climate Change Standards

4.9.1 Global Target

Based on the evidence in the statement of facts agreed between BSCA and EPA regarding the causes and consequences of climate change,[108] BSCA argued that it is the duty of the EPA to develop environmental quality objectives, guidelines and policies to ensure environment protection includes a duty to develop instruments to ensure the environment in NSW is protected from climate change, and that a target consistent with a global average temperature rise of 1.5 °C above pre-industrial levels is appropriate,[109] being the long-term temperature goal in the Paris Agreement.[110] Article 2(1)(a) of the Paris Agreement aims to strengthen the global response to the threat of climate change by "holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels". Limiting the increase in global average temperature to 1.5 °C will ensure environment protection to a greater degree than would be possible if the increase in global average temperature were to be higher.

Under the circumstances, the environmental quality objectives, guidelines and policies to ensure environment protection which the EPA is required to develop, need to regulate sources of direct and indirect greenhouse gas emissions consistent with limiting global temperature rise to 1.5 °C above pre-industrial levels.[111] BSCA argued that this outcome or objective is supported by the general responsibility of the EPA of "ensuring that the best practicable measures are taken for environment

[107] At [52] of the Sackett First Report and see further Section 6) as quoted in [2021] NSWLEC 92 para 75.
[108] Ibid. [2021] NSWLEC 92 para 76.
[109] Ibid. [2021] NSWLEC 92 para 77.
[110] Paris Agreement, opened for signature 22 April 2016 [2016] ATS 24 (entered into force 4 November 2016).
[111] Ibid. [2021] NSWLEC 92 para 90.

protection in accordance with the environment protection legislation and other legislation" (s 7(2)(a) of POEA Act). BSCA submitted that the best practicable measures to protect the environment in NSW from climate change is to reduce direct and indirect sources of greenhouse gas emissions consistent with limiting global temperature rise to 1.5 °C above pre-industrial levels.[112] This of course means that there will have to be significant changes to the management practices for the use of soil to substantially reduce the amount of CO_2 released from the soil environment.[113] It is argued here that this action should take place under the POEA Act.

4.9.2 Local Level Standards

Local action alone by the EPA in NSW will not fully address the problem. Its local action must be combined with multiple local actions elsewhere in order for climate change to be effectively addressed. Some of the local actions that should be taken include, for example, banning certain activities, licensing other activities, and using economic instruments or measures to incentivise or dis-incentivise other activities.[114] The judge characterised the aspect of environment protection in respect of which environmental quality objectives, guidelines and policies need to be developed as being simply "climate change", as this term is sufficiently wide to embrace the phenomenon itself, as well as its causes and consequences. The duty imposed on the EPA by s 9(1)(a) in the current circumstances would, therefore, include developing environmental quality objectives, guidelines and policies to ensure environment protection from climate change.[115] Collectively, this could include guidelines and policies to: achieve net-zero emissions; accounting for carbon credits and emissions; measures to remove CO_2 from the atmosphere and store it in vegetation or soil (if the carbon is stored permanently, this should generate a carbon credit for the landholder); provide long-term support for extension programs necessary to deploy new tools and practices; improve the long-term outlook for emissions reduction by supporting new technologies and opportunities; management controls over carbon farming and land clearing.[116]

4.9.3 Documents Must Meet the Standards Prescribed by the Law

In BSCA v EPA, the assessment of the seven documents relied on by the EPA found that none of them met the statutory description of the instruments that the EPA is

[112] Ibid. [2021] NSWLEC 92 para 91.

[113] See Hannam (forthcoming) Sustainable Soil Management and Soil Carbon Sequestration.

[114] Ibid. [2021] NSWLEC 92 para 95.

[115] Ibid. [2021] NSWLEC 92 para 101.

[116] E.g., see Wood et al. (2021) Section 3, pp. 21–30 "What governments should do to help reduce emissions".

required to develop under s 9(1)(a) of being environmental quality objectives, guidelines and policies to ensure environment protection from climate change. It found that to discharge the duty, the EPA must at least develop environmental quality objectives, guidelines and policies to ensure the protection of the environment from threats of great magnitude and impact, where climate change is one such threat to the environment. The development of environmental quality objectives, guidelines and policies directed towards ancillary or insignificant causes or consequences of climate change was determined by the court to be insufficient to discharge the duty in s 9(1)(a) of the POEA Act.[117]

5 Instruments to Protect the Soil Environment

Following the outcome of BSCA v EPA it is argued that, to ensure the protection of the soil environment from climate change, the EPA should now commence the preparation of a specific instrument to address the quality objectives, guidelines and policies. This decision, together with other recent climate change-related court decisions, brings to mind a range of legal and human issues related to climate change which should be taken into account when designing instruments to protect the soil environment, including:[118]

- Harm to the natural and ecological environment;
- Intergenerational-related harm to the children of the current generation by those making the decisions now that affect the climate in the longer term;
- Obligation of statutory authorities to invoke the duty that they have to climate management under respective statutes;
- Loss of productivity of soil and its effect on food production;
- Taking into account the latest scientific information in IPCC reports;
- The effect of climate change on food supply, the loss of territory and habitable areas, endangered health, and cost of human lives.

Based on the BSCA decision, some of the specific matters that should be addressed in instruments to protect soil from climate change include:[119]

- Describe what climate change is and the specific types of soil management practices that cause a loss of SOC and directly contribute to climate change.

[117] Ibid. [2021] NSWLEC 92 para 143.

[118] Ibid. Wood et al. (2021).

[119] Ibid. [2021] NSWLEC 92 paras 106–143; to discharge the duty in s 9(1)(a) of the POEA Act; see Ernst and Young (2021) figure at 6 "the deliberate and coordinated application of high-impact carbon abatement initiatives, we have modelled a pathway to mitigate on-farm emissions from Australian agriculture".

- The specific land management actions that must be undertaken to reduce loss of SOC and other greenhouse gases from the soil environment to mitigate climate change.
- Set out the objectives and prescribe specific standards and actions to be undertaken to ensure the protection of the soil environment from climate change.
- Specify what approaches, tools or measures will be used to achieve any of the outcomes or objectives implicit in actions described in a regulatory instrument to protect the soil environment from climate change, and outline the criteria against which the outcomes or objectives must be measured.
- Identify the adaptation and mitigation measures to reduce greenhouse gas emissions to ensure protection of the soil environment from climate change.
- Develop environmental quality objectives, guidelines and policies to ensure the protection of the environment from threats of great magnitude and impacts that arise from climate change, e.g., bushfires, intense rainfall, heat stress, cold stress, drought.

6 Conclusions

The BSCA v EPA decision, which orders the NSW EPA to develop environmental quality objectives, guidelines and policies to ensure protection of the environment from climate change, by following its duties under the POEA Act, is a landmark decision in NSW, especially with regard to the level of seriousness that climate change impacts have reached for the NSW environment. This case, and others in Australian and overseas jurisdictions, indicate important progress in society's acceptance of the significance of climate change in the long term protection of the environment in general. This chapter argues that the BSCA v EPA case is particularly significant, however, because the definition of "environment" under the POEA Act clearly encompasses "soil".

The decision is important for a number of reasons. Firstly, given that "soil" is a component of the "environment" it should be protected from climate change under the POEA Act. Secondly, the decision includes many points of law, legal principles and rules that could be useful as a guiding framework to examine existing environmental laws for protection of the soil environment against climate change. While the main objective is to ensure that soil is protected from the impacts of climate change is also critical that "soil" is recognized as a carbon sink and must be protected for this reason. The manner in which soil is used contributes GHGs, and the EPA's policies should be specifically directed to these issues.

Moreover, and of great significance, is the fact that the BSCA v EPA case, and other cases discussed in this chapter, have relied on critical climate science from IPCC reports, and expertly show how it was critical to leading to the decisions in those cases. Most importantly for soil is the role that climate science should play in expert evidence in litigation where climate change is the legal challenge and the soil environment is threatened or harmed by the impacts of climate change. On the basis

of the facts presented in BSCA v EPA in particular, and also in the other cases referred to earlier in this chapter, the IPCC data is likely to be incontrovertible and accepted by the courts as evidence of the risks and threat of climate change. The law is not static, and must evolve and adapt to the most authoritative climate science and soil scientific evidence available to protect the soil environment and to ensure that it is managed in the interests of reducing climate change. A further significant aspect of this case is that statutory nomenclature, such as "environment protection" and "environment," as used in the NSW POEA Act, and other key components of the legislation, such as the "objectives" and duties," must be interpreted according to contemporary ecological and legal standards. This means that climate change, as a threat and risk to the soil environment, is one of the matters in which environmental agencies must exercise their statutory duty adequately, by developing and implementing policies for protection of all elements of the environment from climate change. The global context of climate change and the relevant science is a material consideration when applying the public interest test enshrined in Australian environmental legislation and could equally be applicable in other nations. Respective points of law, legal principles and rules argued in the BSCA v EPA case may also be useful as a guiding framework to prepare new legislation in other parts of the world with the requisite procedures to develop environmental quality objectives, guidelines and policies to protect the soil environment from climate change.

Based on the incidence of climate litigation the past few years, it is likely that there will continue to be frequent legal challenges in Australian jurisdictions alleging failure by a decision-making authority to properly take climate change into account when approving a potential GHG-emitting project. Given these important developments, there is likely to be an increased sensitivity to, and awareness of, the materiality of climate change considerations by decision making authorities when making determinations. As a result, it is imperative that any application by a proponent for an approval, licence or funding linked to a GHG emitting project, properly address both the contributions to climate change that may be caused by the project and the impacts of climate on the natural environment, including the soil environment. This includes consideration of the longer term impacts of climate change. Cumulatively, these developments emphasise that the state of play surrounding climate change is rapidly shifting.

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