APPENDIX 1 - DEFINITIONS IN THE LITERATURE OF MĀORI ECONOMY AND MĀORI IN THE ECONOMY

Table 1 Definitions of Māori economy and Māori in the economy found in literature, listed in rough order of scope, from the narrowest to broadest

Definition	Inclusivity	Source
Māori authorities are defined as businesses that receive, manage, and/or administer assets held in common ownership by iwi and Māori. Māori authorities are largely identified through their tax codes as registered with Inland Revenue. Any business within a Māori authority ownership group is also included for the purposes of Tatauranga umanga Māori	**Low**; focuses on formal Māori authorities, excluding other contributors.	*Stats NZ - Tatauranga umanga Māori – Statistics on Māori businesses: 2021 – update*
A business with at least one owner who identifies as Māori by ethnicity and/or descent and had non-zero income from self-employment (this definition includes sole proprietors)	**Low**; limited to self-employed individuals or sole proprietors.	*2024 Te Puni Kokiri: Understanding the exposure of climate hazards on Māori–owned businesses*
A business with either: • A sole proprietorship owned by a Māori person with non-zero income from self-employment in 2020. • A company or partnership where at least 50% of the income paid to directors, partners, or active shareholders was associated with Māori who identify as Māori by ethnicity and/or descent.	**Low**; focuses only on specific business types and income structures.	*2024 Te Puni Kokiri: Understanding the exposure of climate hazards on Māori–owned businesses*
Māori post-settlement governance entities, Māori land trusts and incorporations, and Māori self-employed businesses engaged in trade and exchange.	**Moderate**; excludes households, employees, and broader contributors.	*Manaaki Whenua 2021: a changing climate, a changing world*
For the purposes of measuring the Māori economy, a Māori business was deemed to be when a business, individually or collectively, was owned by someone identifying as Māori.	**Moderate**; excludes broader contributions such as employees or households.	*BERL 2021: Māori economy emissions profile*
The term "Māori Economy" captures a broad range of inputs which includes Iwi entities, Māori trusts and incorporations, Māori	**Moderate**; includes diverse contributors (trusts, iwi,	*Chapter 19 - Aronga Kaupapa - Te Whakawhiti hei oranga mō te Iwi Māori - Policy*

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Authorities, Māori self-employed, and Māori employers.	employers) but lacks employees' perspective	*direction for an equitable transition for Iwi/Māori*
The Māori contribution to the economy comprises all individuals, households, businesses, and collectives that self-identify as Māori. This includes Māori entrepreneurs active in individually owned businesses, as well as the contribution of Māori employees' earned incomes.	**High**; captures broad participation, including entrepreneurs, employees, and collectives.	*MBIE - Strategy to 2040 – The Crown-Māori Economic Growth Partnership;* Māori Economic Development Panel November 2012

APPENDIX B - TAXONOMY OF CLIMATE CHANGE IMPACTS

Climate Change Impact	Agriculture	Horticulture	Forestry	Fisheries	Other
Floods	(-) Similar exposure for Māori and non-Māori-owned businesses (1-2 percentage points difference) (-) Western regions more prone to flooding, affecting pastoral quality and production rates	(-) Similar exposure for Māori and non-Māori-owned businesses (1-2 percentage points difference) (-) Erosion risks in western regions affecting yields	(-) Similar exposure for Māori and non-Māori-owned businesses (1-2 percentage points difference) (-) Increased risk of erosion and land instability in wetter regions	No comment	(-) Whenua Māori (Māori land) and land returned through the Treaty settlement process are often in coastal or lowland areas, making them susceptible to flooding, erosion, and sedimentation.
Extreme weather events, e.g. Tropical storms or extreme rainfall	(-) Risks to pastoral productivity (-) Erosion risks, especially on hill country land (-) Potential disruption to farm operations	(-) Risks to kiwifruit production in Bay of Plenty (-) Significant risks for Māori investment in the Bay of Plenty region (-) Potential crop damage and yield losses	(-) Forestry plantations particularly vulnerable to storms (-) Increased risk of erosion and land instability	(-) Increased storms affecting marine environment and fishing operations	(-) Whenua Māori (Māori land) and land returned through the Treaty settlement process are often in coastal or lowland areas, making them susceptible to flooding, erosion, and sedimentation.
Droughts	(-) Increased frequency could reduce pastoral productivity by up to 15% by 2050 (-) Significant risk for sheep and beef farmers in eastern Aotearoa-NZ (-) High probability of challenges for Māori farmers in northern and eastern areas (-) Reduced soil	(-) Risks to production (-) Reduced river flows aggravating water management challenges (-) Potential crop failures or reduced yields	(-) Increased risk to forest growth, especially in drier, hotter regions (-) Higher fire risk	(-) Potential impacts on freshwater fisheries	No comment

Climate Change Impact	Agriculture	Horticulture	Forestry	Fisheries	Other
	moisture and groundwater supplies				
Extreme heat and heatwaves	(-) 19% exposure for Māori vs 25% for non-Māori (-) Increased heat stress days for animals (-) Earlier maturation of pastures, potentially reducing quality	(-) Risks to production (-) Potential heat damage to crops (-) Increased water demand for irrigation	(-) 19% exposure for Māori vs 25% for non-Māori (-) Increased fire risk (-) Potential impact on tree growth in hotter regions	(-) 19% exposure for Māori vs 25% for non-Māori (-) Warming temperatures impacting commercial and non-commercial fisheries	(-) Risks exist for Māori in manufacturing due to heat-related health impacts. (-) Māori health outcomes are particularly vulnerable to climate change, with risks from heatwaves, vector-borne diseases, and toxic algae blooms.
Coastal inundation / sea level rises	(-) May disrupt access to settlements if roads are at risk of regular inundation (-) Potential loss of coastal agricultural land	(-) May disrupt access to settlements if roads are at risk of regular inundation (-) Potential loss of coastal horticultural land	(-) May affect coastal forests and access to forestry areas	(-) Potential impacts on coastal fisheries and aquaculture	(-) Māori businesses in accommodation and food services face higher risks from coastal inundation compared to non-Māori businesses (-) Whenua Māori (Māori land) and land returned through the Treaty settlement process are often in coastal or lowland areas, making them susceptible to flooding, erosion, and sedimentation. (-) Coastal erosion and flooding threaten the preservation of Māori cultural heritage, and agricultural land is vulnerable to extreme weather.
Wildfires	No specific information provided	No specific information provided	(-) Increased risk of extreme fire conditions (-) Potential loss of ecosystems and habitats	No specific information provided	No comment

Climate Change Impact	Agriculture	Horticulture	Forestry	Fisheries	Other
Vector-borne disease	(-) Increased risk to agriculture from pests and diseases (-) Changes to pest and disease occurrence in animals and pastures	(-) Increased risk to horticulture from pests and diseases (-) Changes to pest and disease occurrence in crops	(-) Increased risk of pests affecting forests	(-) Potential increase in marine pests and diseases	(-) Māori health outcomes are particularly vulnerable to climate change, with risks from heatwaves, vector-borne diseases, and toxic algae blooms.
Warming land temperatures	(+/-) Faster growth of pasture and longer harvesting seasons (-) Reduction in pasture quality (-) Evolution of pasture base toward less palatable herbage (+) Potential expansion of current agricultural ranges	(+) Potential opportunities for new crop varieties (-) Reduction in frost frequency may adversely impact some operations (+) Possible expansion of horticultural zones	(+) Potential creation of new habitats for tree species (-) Existing habitats may become unsuitable (+) Up to 10% increase in productivity in some regions due to CO2 fertilization and longer growing seasons	(+/-) Changes in productivity of warm and cold water marine species (+) Potential southward shift of tropical species presenting new opportunities	No comment
Warming sea temperatures	No specific information provided	No specific information provided	No specific information provided	(-) 20-30% reduction in traditional Māori fisheries by 2050 (-) Impacts on Kaura, paua, snapper, and hoki fisheries (+) Potential for new species in southern waters	(-) Māori health outcomes are particularly vulnerable to climate change, with risks from heatwaves, vector-borne diseases, and toxic algae blooms.
Water scarcity	(-) Impacts on Māori communities and agricultural end users (-) Aggravates existing water management challenges (-) Reduced soil	(-) Impacts on Māori communities and horticultural end users (-) Challenges for irrigation-dependent operations	(-) May affect forest growth and establishment, particularly in drier regions	(-) Potential impacts on freshwater fisheries	(-) Many Māori communities lack access to reticulated water and sewage systems, which increases health risks and the cost of maintaining infrastructure.

Climate Change Impact	Agriculture	Horticulture	Forestry	Fisheries	Other
	moisture and groundwater supplies				
Policy impacts	(-) Challenges in transition to low emissions economy may negatively impact Māori whanau (-) Potential negative impacts on dairy, milk, and meat product output through to 2080	(-) Challenges in transition to low emissions economy may negatively impact Māori whanau (+) Potential positive impact on crops output through to 2080	(+) Carbon farming opportunities for landowners (-) ETS may lock some landowners into forestry, limiting land use options (-) Pre-1990 forests ineligible for earning emissions trading units (-) Small landholdings face disproportionate costs in ETS participation	impact of meeting climate change targets on the economy - i.e., restoring degraded ecosystems and land, sea and waters (-) Initial negative impact on total fisheries revenue of $0.8 billion in 2030 (+) Potential benefits of $3.5 billion by 2080 compared to no-action scenario	No comment
Rainfall pattern	(+) Dairy industry may benefit from increased production due to increasing rainfall (-) Changed rainfall regimes likely to exacerbate risks for sheep and beef farmers (-) Increased variability affecting agricultural productivity	(+/-) Projected changes may present new opportunities in some regions, but may have little benefit for majority of Māori landowners (-) Increased variability affecting horticultural productivity	(-) More pronounced west-east coast rainfall gradients expected to decrease growth rates of plantation forests in the east of the North Island	(-) Changes in ocean currents affecting fisheries productivity	No comment
Other	(-) Intensification of carbon and nutrient cycles (+) Increased atmospheric CO2 levels may have beneficial	(+) Potential diversification of horticulture practice (-) Challenges in implementing climate-resilient practices on	(-) Slower growth and high establishment costs of native forests pose economic challenges (-) Climate change	(-) Ocean acidification impacting shellfish development (-) Changes in marine environment affecting customary and	(+) Climate change may increase demand for Māori workers in construction and health sector (-) Māori housing, especially in rural and remote areas, is vulnerable to climate change

Climate Change Impact	Agriculture	Horticulture	Forestry	Fisheries	Other
	effects on pasture production, especially in cooler, wetter areas (-) Limitations on options for climate-resilient land uses, particularly for underdeveloped Māori-owned land	underdeveloped Māori-owned land	expected to affect wood quality and species-mix in future plantations (-) Māori disproportionately affected due to owning 40% of commercial forests	commercial interests (-) Māori own 33% of fisheries quota by volume and 20% by value (-) Two-thirds of Māori fisheries assets concentrated in four potentially at-risk species	impacts, affecting homes, infrastructure, and cultural sites like marae, burial grounds, and food-gathering areas. (-) Climate change may disrupt Māori customs and economic opportunities, especially in tourism and agriculture, and affect relationships with taonga (treasured natural resources). (-) Economic inequities reduce Māori capacity to adapt to climate change, as they are heavily invested in climate-sensitive primary industries. (-) Māori investments in marine mammal tourism face risks due to climate change impacts on marine life (-) Climate change threatens culturally significant sites and ecosystems, including marae, urupā, and food-gathering areas (mahinga kai). (-) Climate change poses risks to tourism, particularly Māori investments in this sector, due to changes in weather patterns, species migration, and habitat loss. (-) Māori communities in rural areas, especially near coastlines, floodplains, and waterways, face the highest exposure to climate hazards, including water stress

Climate Change Impact	Agriculture	Horticulture	Forestry	Fisheries	Other
					and coastal erosion. **(+/-) Climate impacts will vary across iwi (tribes), hapū (sub-tribes), and whānau (families), requiring tailored approaches to adaptation.**