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# **Ecofeminist Costs Analysis of the Climate Crisis in Toliara**

## **Case study report**

*Zo Randriamaro*

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## INTRODUCTION

WoMin and CRAAD-OI have agreed to work together on an ecofeminist cost analysis that will be conducted in the district of Toliara II of the Atsimo Andrefana region, where CRAAD-OI has been working with women's groups for many years. Using participatory research methods, this case study aims to assess both the visible and hidden costs of the climate crisis which are mostly borne by women in this region.

## I. BACKGROUND TO THE TOLIARA CASE STUDY

This costs analysis is meant to inform the CRAAD-OI's advocacy efforts towards the international negotiations on Loss and Damage, with a view to provide the Malagasy delegation with evidence-based and concrete demands for reparations from the countries of the Global North that are responsible for the climate crisis and the consequent loss and damage that Madagascar has experienced since a long time.

At the national level, the case study results will also serve as a basis for women in Toliara to reclaim their rightful share of the funding and support for adaptation that should be provided by the Malagasy State.

### 1.1. Objectives of the case study

Against this background, the Toliara case study aims

- 1) to document, assess and arrive at estimates of the costs incurred by women and communities in relation to the following impacts and implications of the climate crisis:
  - undermining women's livelihoods and right to an adequate standard of living;
  - eroding women's role in food production and stewardship of natural resources
  - increasing women's unpaid and reproductive work;
  - affecting women's health;
  - causing gender-based violence – economic and sexual;
  - generating intergenerational costs along with losses in wealth and choice in a compromised environment and climate for future generations;
  - the impact of living in perpetual crisis and the inability to recover from losses
- 2) To provide a space for women to share on their experiences and through the collective dialogue to make the connections between the impacts and costs of the climate crisis to them and the corporations/culprits causing the crisis, and climate debt and reparations owed to them.
- 3) To inform concrete and evidence-based demands for compensation and reparations that reflects the damage experienced by women and their communities in the framework of the international negotiations on Loss and Damage and Adaptation.
- 4) To serve as a basis for women in the target communities to reclaim their rightful and effective access to adequate adaptation support.
- 5) To inform a possible legal case for climate debt and reparations against a fossil fuel corporation that has caused the climate crisis.

### 1.2. Methodology

Drawing on the above, CRAAD-OI sought to arrive at estimates of the externalised costs absorbed by women and the environment, including ecological, intergenerational, cultural and

social costs, which are ignored, neither costed nor compensated against corporations and states in the existing cost analyses of climate change in the context of Madagascar.

In general, the Toliara case study relied on projections based on the research results from the fieldwork that was conducted in February 2023 by the CRAAD-OI team in four (4) communities of farmers and fishers affected by climate change (Ranobe, Benetse, Ankililoaka, Manombo Sud) in the district of Toliara II.

### **1.2.1. Research methods and tools**

A resource map was developed for a general introduction of participants in focus group discussions to the analysis of climate change-related changes in access to natural resources and in relationships with the natural environment. A checklist of guiding questions was used for focus group discussions on the impacts and implications of climate change on women's rights and living conditions, with a view to uncover its hidden and untangible costs for women and the environment.

In addition, a detailed questionnaire addressed the specific impacts of climate change on access to land, water, energy; food, livelihoods, income, health, and women's productive and reproductive workload. This was meant to allow for the actual costing of the various impacts, including in quantitative terms.

Access to resources and services was also assessed in relation to the costing of the impact on the burden of women's unpaid care work, either through estimates of cost of labour time (in relation to the value of wage labour) based on the analysis of women's time budget in the face of the climate crisis (using the 24-hour clock), or through the consequences of increased hardships. The cost analysis was also drawing on secondary literature from other cases where costs of similar impacts have been analysed.

Interviews of key informants focused on establishing the average earnings and basket of food consumption prior to the drought, their incomes and consumption patterns at present, as well as the impact of the climate crisis on their food security and nutrition. Such individual interviews also addressed issues around health and violence against women.

The societal impact of climate change was assessed with a scale related to the target group's perceptions of stress and well-being before and after the onset of the climate crisis, with 1 being an extreme feeling of worry and stress and 10 being a great feeling of happiness and well-being.

### **1.2.2. Limits of the research**

The CRAAD-OI team has adapted the methodology developed by WoMin for working with partners on country case studies for ecofeminist cost analyses of large-scale extractivist projects (e.g. the coal-fired power plant in Sendou, Senegal) to the Toliara case study.

This implies that it does not address the full range of costs identified by WoMin, but focuses on the most relevant costs generated by the climate crisis and its main impacts on women in Toliara, in order to come up with a resource tailored for advocacy and campaigning purposes that can be used at both international and national levels.

With regard to a full estimation of the externalised costs of climate change borne by the affected women and communities, while it addresses the Losses and Damage caused by the recurrent climate - induced cyclones that have devastated the island, the case study report has not been able to come up with an accurate calculation of all the costs related to Damage and Losses for each of the women's groups. Similarly, quantitative and precise estimates for several non economic costs resulting from slow-onset events could not be provided.

## II. THE CONTEXT OF CLIMATE CHANGE IN THE TOLIARA II DISTRICT

### 2.1. Social and Economic Context of the Toliara II District<sup>1</sup>

#### 2.1.1. Local economy and livelihoods

The Toliara II district is located in the Atsimo Andrefana (South West) region, which is part of so-called “Great South » marked by the severe climatic conditions and phenomena that constitute obstacles to the development of the territory. The latest population census (RGPH 3) in 2018 for the region shows a population of 1.851.793 people, including 47,4 percent of women. The population of the Toliara II district was estimated at 391 438 in 2018. 80.1 percent of the population of the Atsimo Andrefana Region lived below the poverty line<sup>2</sup> in 2012 according to the results of the ENSOMD (2012-2013). This is well above the national average of 71.5 percent.

The local economy is predominantly rural and agricultural, and is entirely ecosystem-dependant. The main crop produced in the Toliara II district is rice, followed by other food crops such as maize, cassava, sweet potatoes, beans and groundnuts. Other cash crops such as sugarcane and cotton are also grown by a minority of producers. The main vegetable crops are brèdes, onions, peas (*voagnemba*), cowpeas, lentils and cucurbits.

Livestock production includes cattle, pigs, goats, sheep and poultry. Cattle breeding is the most important activity, with an estimated herd of 747,000 heads of zebus for the Atsimo Andrefana Region, representing over 11 percent of the country's livestock. Goat breeding also plays a major role, with an estimated 389,000 goats, making up over 57 percent of the national herd.

Traditional fishing is the only source of income for the Vezo coastal populations of the Atsimo Andrefana region, where drought has pushed inland populations closer to coastal areas. Most Vezo fishermen in the Toliara II district work the coral reefs as a subsistence, artisanal fishery. Their fishing zone is limited to less than 10 km from the coast, as the boats they use don't allow them to venture any further. Their catch is intended for immediate consumption, or for drying and smoking. While women used to be involved only in marketing to other rural communities, the interviews with women from fishing communities revealed that they have been increasingly involved in fishing activities since 2018.

The Toliara II district's rural society is strongly imbued with culture, traditions and customs. There are a number of cultural and religious sites throughout the Atsimo Andrefana Region, including several historical and archaeological sites located in the Toliara II district. These sites bear witness to the region's history, and are also the symbols of the customs and traditions still

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<sup>1</sup> The main source for this section is “ Projet MIONJO, Cadre de Gestion Environnementale et Sociale, 2020 ».

<sup>2</sup> According to the definition of poverty and the calculations of poverty indicators, those classified as poor are those with an aggregate consumption level (food and non-food) below the national poverty line of 468,800 Ar/person/year (EPM 2005 and 2010 main reports).

jealously guarded by the local population. Most importantly for this analysis, these also constitute an important part of the cultural heritage and rights impacted by the non economic losses and damage from climate change.

### 2.1.2. Gender norms and roles at household and community level

Gender inequalities are still perceptible in the Atsimo Andrefana Region. Over 45 percent of women in this region claim to have less income than men from the same activity. What's more, only 27.8 percent of women are financially independent. Most of them manage their finances jointly with their husbands. Thus, it is widely understood that men are the primary income earners in a household, and that they will make decisions about how to spend that income.

However, at the local level, the rate of women's participation in household decision-making is 83 percent, compared with 72 percent nationally. It is only when it comes to making decisions on major expenditure that the rate of women's participation remains low. Notwithstanding this, in times of economic hardship or emergencies, savings are used and assets under women's care are liquidated first. This further limits women's economic and financial independence, as their items are considered less important than other household assets.

In the rural Toliara II district, cultural norms around land ownership also impede women's economic empowerment and decision making. Traditionally, women cannot own land, which is often inherited or acquired by elders in the community, making it difficult for young adults to become landowners. Married couples or single men who do not own land typically work as tenant farmers, but single women with no land usually only work as low paying seasonal day laborers on fields.

A significant share (37 percent) of households in the Atsimo Andrefana region includes only one parent (separated, divorced, widowed and single) with a majority headed by women, against 24 percent at the national level. The proportion of female-headed households (FHH) in the study's target groups mirrors this share at the regional level. FHH are poorer on average and therefore spend relatively more on food than those headed by men. In addition to socio-economic factors (wealth at the household level), FHH have a higher risk of being severely food insecure compared to male-headed households as these FHH lack a more stable source of income in the absence of spouses.

Binary gender systems define specific roles and responsibilities for men and women as well as married women and single women, particularly in terms of productive labor. Women's labor is undervalued compared to men's, particularly in rural areas where agriculture dominates. Women and men continue to fulfill traditional gender roles which relegate women and girls to unpaid household duties such as cooking, cleaning, and child rearing and leads to an imbalance in power and decision-making within the household. Married women cannot legally be recognized as the head of household in the same way that men are, and many women and girls continue to face sexual harassment and exploitation.

Time use surveys from a USAID gender analysis<sup>3</sup> in the east, south east, and south west regions found that women spend approximately four times as many hours on household activities compared to their spouses, yet men typically have the final say when making decisions

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<sup>3</sup> [https://banyanglobal.com/wp-content/uploads/2019/09/USAID-Madagascar-IMPACT-GESI-Analysis-Report\\_Final-English-1.pdf](https://banyanglobal.com/wp-content/uploads/2019/09/USAID-Madagascar-IMPACT-GESI-Analysis-Report_Final-English-1.pdf)

regarding household affairs. This includes the time that women and girls spend on caring for sick family members, which is considered a primary responsibility for them. The interviews on time use made with the women's group in the study sites confirm these findings.

Violence against women is relatively low in the region, with only 27 percent of women reporting having experienced violence, compared with a national average of around 30 percent. It should be noted that this figure may be underestimated, as women are still subject to a culture of silence. The most common type of violence in the region is physical violence (14.3 percent, followed by psychological violence (13.9 percent).

## **2.2. The gendered impacts of climate change in the Toliara II District**

At the national level, climate change impacts can be broadly linked to: (1) increased temperatures; (2) extended drought periods and increased variability of rainfall; (3) intensification of cyclones and floods associated with cyclonic disturbances; and (4) increasing sea level and sea-surface temperatures. The sub-sections below highlight the main impacts at the local level in the Toliara II district, with a focus on the terrestrial and marine ecosystems, along with public health.

The impacts of climate change affect regions, generations, age groups and genders differently (IPCC, 2001). In Madagascar, climate change has disproportionate and specific effects on women because of their gender roles in society and differential access to social, economic and physical resources (as described in sub-section 2.1.2 above). The disparities resulting from women's subordinate social position within the family and the community are generally aggravated by the impacts of climate change on core areas of women's responsibilities and livelihoods (food, water and energy supply).

The description below of the diverse impacts of climate change in the Toliara II district must be read against the background of differential power relations between men and women and unequal access to and control over resources, which mean that men and women do not have the same capacity to adapt. Women are more vulnerable to exposure to climate risk and do not have the same capacity to adapt and recover from the impacts of climate change.

### **2.2.1. The Ecosystem Impacts of Climate Change<sup>4</sup>**

Madagascar is currently among of the world's top 10 vulnerable countries impacted by climate change. The island is considered as a cyclone hotspot because it is located in the South Western Indian Ocean (SWIO) region which is one of the most active areas in the world in terms of tropical cyclone development. On average, ten cyclone events with wind speeds greater than 63 km/h and possibly exceeding 200 km/h occur each year in the region.

With regard to the main climatic hazards, eight cyclones have hit the district of Toliara II in the last twelve (12) years, with wind speeds of around 83 km/h to 100 km/h. During the 2021/2022 cyclone season alone, six cyclone events landed in Madagascar with damages across 17 of the country's 22 regions. In February 2023 alone, the highly intense tropical cyclone Freddy wrecked havoc on the region. The loss of lives and material damage had been very significant,

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<sup>4</sup> Sources: USAID 2021. Annex F: Climate Change Analysis ; GIZ 2020. Climate Risk Profile: Madagascar.

with thousands of housing units, schools and road infrastructure damaged, and irrigation works and perimeters flooded.

The climate of Toliara II is of tropical semi-arid type characterized by a long period of drought from 7 to 9 months between the months of March and December. It is one of the Districts most affected by drought in Madagascar, with a natural water deficit that results in a propensity for salinization of water and soil, and where human activities are likely to aggravate the process of land and water degradation.

The main manifestation of climate change is the increase in daily minimum temperatures. The increase in daily minimum temperature was more than 1°C from 1961 to 2005. While the experts in analyses of climate change predicted that the average annual temperature in southern Madagascar will increase by at least 1.5°C by 2050 compared to the 1961-1990 period, Toliara actually experienced an average temperature of 36-37°C during the last week of January 2023, which points to a higher than expected increase.

As mentioned earlier, the area is also facing tropical and extra-tropical cyclones of increasing intensity, together with more frequent extreme waves and storms events, and a modification in the distribution and quantity of rainfall. Thus, rainy seasons have also become shorter, as the maximum number of consecutive dry days in a year has increased by about one (1) day per year over the last 45 years.

The total annual rainfall has also decreased during this period, while the region is already characterized by low rainfall, which decreases steadily from north to south. As rainfall falls during shorter and shorter periods, this has led to an increase in the intensity of rainfall, particularly in the northern half of the south west region where Toliara II is located<sup>5</sup>. Thus, the sudden increase in rainfall over shorter periods had caused huge floodings in early 2023.

The Toliara II area is home to several types of terrestrial ecosystems including a dense mangrove forest; terrestrial coastal forest; marshland; grassland; rangeland and savannah; baobab trees; estuary; and, a freshwater aquifer. The reduction in the related ecosystem goods and services is already visible in the increased number, intensity, and duration of extreme events such as droughts that negatively affect biodiversity and reduce productivity<sup>6</sup>, with subsequent increase in food insecurity and hunting of wildlife such as lemurs and unique endemic animal species<sup>7</sup>.

The existing coastal/marine ecosystems in the Toliara II area include: coastal river and wetlands; fringing coral reefs; sandy beach; rocky coast; and, sand dunes. In addition to a sea level rise, a gradual sea surface temperature increase of 1 to 3°C, and the ocean acidification, the climate crisis has decreased the number of marine species (mollusks, crustaceans, and coral reefs of cold water) in seasonal activities and migration.

According to scientists and experts, the climate crisis and associated biodiversity crisis increase stress on both the terrestrial and marine ecosystems, resulting in their reduced productivity and resilience. This is clearly visible in the Atsimo Andrefana region which is predominantly rural and agricultural, with a potential arable area of 140,800 ha spread over the nine Districts, of which 105,000 ha (74.6 percent) is cultivated. However, in the space of just a few years,

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<sup>5</sup> BROUDIC, C & RAZAFINDRIANILANA T, 2020.

<sup>6</sup> Rakotondravony et al., 2018.

<sup>7</sup> Morelli et al., 2020

cultivated land has shrunk by more than half. Indeed, from 2009 to 2017, cultivated land fell from 74.57 percent to 21.78 percent, i.e. almost a quarter of arable land. In Toliara II district, the ratio between cultivated and arable land fell from 76.0 in 2009 to 28.64 in 2017<sup>8</sup>.

Several factors explain this significant decrease in the area of cultivated plots. Chief among these is insufficient rainfall related to climate change, which prevents crops from being planted at the right time. Other factors include silting-up of cultivated land; deterioration of the hydro-agricultural structures that irrigate the perimeters; infestation of crops by army worms, which are highly resistant to the various pesticides; and, lack of materials and inputs for farmers<sup>9</sup>.

It should also be noted that the south of Madagascar was struck by back-to-back droughts during 2019- 2021, the worst in 40 years, exacerbated by climate change and worsening land degradation. This had a disastrous impact on agricultural productivity in the district of Toliara II as evidenced by the research results.

### 2.2.2. Impacts on public wellbeing and health<sup>10</sup>

Climate change in Madagascar is anticipated to correlate with three (3) main types of health impacts through the primary drivers and pathways of impact described below. It is important to note that these impacts play out in a country where the healthcare system is characterized by a history of poor health service provision, limited budgets, and low capacity.

#### **a) Direct impacts on health**

The first type includes the direct impact on health such as injuries, death and diseases due to extreme weather and climate events which are increasingly intense and frequent with commensurate impacts on human health, including the many deaths per year due to the cyclones and floods. Between 1990–2011, more than 2 000 deaths were attributed directly to cyclones, not counting the deaths due to their deleterious impacts on access to safe water sources, food security and the spread of communicable diseases.

Conversely, drought may also increase a range of health impacts linked to reduced access to water, as well as degraded water quality and wildfires.

#### **b) Natural system-mediated impacts**

As temperatures continue to increase as the main manifestation of climate change in Madagascar, heat-related mortality, along with other impacts on the general health and productivity of the population, is expected to worsen and to reach about 50 deaths per 100,000 among the elderly (65 years and older) by 2080 under a high greenhouse gas emissions scenario. As a result of the higher temperatures, increases in malaria are also anticipated throughout the country in the future.

Through geographic and seasonal changes, climate change is expected to alter the distribution of diseases borne by vectors such as ticks, fleas, and mosquitoes, as well as helminthic, waterborne and hygiene-related diseases.

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<sup>8</sup> Projet MIONJO, Cadre de Gestion Environnementale et Sociale, 2020.

<sup>9</sup> Ibid.

<sup>10</sup> Source : World Bank, 2018. Madagascar Climate Change and Health Diagnostic. Risks and Opportunities for Climate-Smart Health and Nutrition Investment.

Additionally, climate change is projected to account for acute and chronic respiratory infections due to air pollution from increasing ground-level ozone and/or particulate matter, among other pollutants.

### c) Human system-mediated impacts

With the El Nino weather phenomenon, climate change has caused the dramatic drop in rainfall in 2016 that “prompted harvest losses of up to 95 percent, brought food insecurity to more than 1 million people, forced 35,000 children under 5 to suffer from moderate acute malnutrition and another 12,000 from severe acute malnutrition”.

Climate change will increase the stress on local food systems and malnutrition because of its contribution to the damage to cropland, collapse of fisheries, CO2 impacts in reducing the micronutrient content of food crops, deforestation and reduced access to wild foods

Furthermore, climate change is expected to correlate with deteriorating mental health among the populations affected by climate shocks and stresses and/or other environmentally determined diseases, and even more so among displaced and further impoverished populations.

## III. ASSESSMENT OF COSTS RESULTING FROM CLIMATE CHANGE

### 3.1. Conceptual and analytical approach

This section focuses on the conceptualization of the different types of costs analysed in this report. Given the objectives of the study, it is clear that it seeks to uncover and make visible all the costs resulting from climate change, especially those costs that are invisible and/or hidden in the conventional analyses of the costs of climate change.

As such, our analysis recognizes that (1) costs can result in the form of harms to the affected people whenever a climate-related event negatively affects a wide range of things important to them; (2) costs are gendered, which implies that women pay a disproportionate share of these costs because of gender-based asymmetries in their distribution at the household and community level.

Some harms/costs might involve the loss of tangible things - such as the population of fish needed by fishers and their community - while others might involve the loss of intangible things, like the degradation of sacred sites with high cultural value to the local community

Additionally, our analysis gives equal importance to market and non-market goods and services. In particular, it considers that the absence of a market price does not mean that an ecosystem good or service negatively impacted by a climate-related event has no economic value. This is especially since most of the costs borne by women are outside of the market.

The concepts addressed in this analysis are defined as follows:

- **“Economic cost”** refers to a reduction in wellbeing as climate-related events and impacts result in: the loss of life, health, security, social harmony, or quality of life; increased expenditure of time or money to maintain a given standard of living; reduction in the quantity or value of goods and services available to families, communities, and future generations ; increase in the risk of extreme weather and other undesirable events.
- **«External costs»** are those economic costs that result from an event or impact related to climate change and are borne by a family, community, or generation that does not have any

part in the event or impact, or otherwise directly benefit from it. External costs come in many forms and include, for example, the costs that will materialize as extreme weather events related to climate change kill people prematurely and destroy their houses and economic production sites.

- External costs from ecological degradation by a climate-related event derive from its impacts on economic activity and on the economic well-being of society, with direct and indirect economic costs. For instance, the risks of illness and death imposed on a community exposed to cyclones entail a **direct economic cost**, as the fear of illness and death resulting from these risks imposed on the population constitute a reduction in economic well-being, i.e., an economic cost. **Indirect economic costs** will materialize as the cyclone degrades an ecosystem's production of goods and services and this reduction decreases the economic well-being of the population that otherwise would have enjoyed these goods and services.

### 3.2. Estimation of Damage and Losses

What Madagascar is facing is clearly a dire situation of loss and damage sustained by climate change, which cannot be avoided by mitigation, adaptation or sufficient disaster risk management. This situation keeps its people unjustly subject to the destructive effects of climate change, while also trapped in vicious cycles of odious debt that the country is forced to take on - largely from the wealthy high emitting countries - to recover from sustained disasters and their socio-economic ravages.

#### Working definitions of Losses and Damage used in this report

The term '**loss and damage**' refers broadly to the entire range of damage and permanent loss 'associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change' that can no longer be avoided through mitigation nor can be avoided through adaptation.

**Damage** is defined as the cost of replacing and/or repairing physical assets and stocks that have been totally or partially destroyed in the area affected by the disaster. **Losses** refer to changes in economic flows resulting directly from the disaster and accumulated in the agricultural cycle coinciding with the disaster (this includes reductions in crop, livestock, fishery, aquaculture and forestry production). Some damage can be rehabilitated (such as damage to infrastructure)

**Economic losses** : loss of resources, goods and services that are commonly traded in markets. Examples of economic losses include loss of income (crop loss due to drought or extreme heat; income loss due to forgone business operations or revenues from tourism or physical assets (structural damage to infrastructure or property from floods or hurricanes).

According to the UNFCCC, the most common **non-economic losses and damage** refer to items that are not commonly traded in markets and may impact individuals, society or the environment. They include: the loss of life, health or mobility (individuals); the loss of territory, cultural heritage, Indigenous knowledge, local knowledge or societal or cultural identity (society); and the loss of biodiversity or ecosystem services (environment)<sup>11</sup>. Most non-economic cannot be rehabilitated (e.g., cultural loss, loss of ecosystems, melted glaciers, loss of human life).

**Extreme events** : e.g., tropical cyclones, storm surges, floods, drought and heat waves.

**Slow-onset events** include sea level rise, increasing temperatures, ocean acidification, glacial retreat and related impacts, salinisation, land and forest degradation, loss of biodiversity and desertification.

*Adapted from UNFCC*

<sup>11</sup> <https://unfccc.int/sites/default/files/resource/docs/2013/tp/02.pdf>, table 2.

During the last five years, losses and damage associated with floods and cyclone events in Madagascar are estimated at about US\$ 470-940 million per year. Six tropical cyclones made landfall over the island between January and April 2023. They devastated the population's livelihoods and damaged cash and food crops, including in the Toiara II district, and significantly reduced the ability of affected households to meet basic food needs. The damage was estimated at \$61 million in food crops, \$78 million in cash crops and \$1.5 million in livestock.

At the COP26 climate conference in 2021, Madagascar's environment minister told the BBC "the country had submitted a plan to the COP26 climate conference, which showed it needed \$1 billion a year to adapt to the effects of climate change." Costs associated with the implementation of adaptation actions can be used as a reference for the estimation of the compensation owed to the victims of the adverse effects of climate change, which would be about US\$6 178 251<sup>12</sup> per year for women living in the Toliara II district.

While the estimation of the sectoral and cross-sectoral damage and losses (in social sectors such as Health, Education, Water Supply and Sanitation, etc.) is typically made at the macro level, which is beyond the scope of this study, it is clear that these entail costs for the affected communities who cannot have access to these essential social services.

The non economic losses and damage mentioned above do not include important types that must also be counted and compensated, as evidenced in the study results. Chief among these are the profound impacts of losses and damages on the mental health and emotional wellbeing of the affected people. The study found that these can manifest in various kinds of psychological responses to losses and damage, ranging from anxiety to depression.

Another critical non economic loss is the intergenerational impact on the longer term of food insecurity and malnutrition on young people's lives, affecting their physical and cognitive development, education, subsequent long-term access to opportunities and livelihoods, and exacerbating gender inequities.

### **3.3. Ecofeminist analysis of external costs based on the research results**

Based on the analysis from an ecofeminist perspective of the primary data collected in each of the research sites, this section aims to arrive at estimates of the external costs incurred by women and communities in relation to the findings on the gendered impacts of climate change. The base year for this analysis is 2018, which marks the onset of the great drought and climate crisis in the Toliara II district.

It should be noted that a large part of the external costs that have been identified cannot be quantified with precision nor estimated in monetary terms. This is especially since such external costs are mostly non economic and resulting from slow-onset events.

#### **3.3.1. External costs from the degradation of ecosystems**

##### **a) Food insecurity and malnutrition**

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<sup>12</sup> Projection based on a total population number of 30,3 million and a total number of women living in the Toliara II district of 187 201.

As discussed above, hunger and undernutrition together with the loss of livelihoods and income constitute a major part of the external costs of climate change borne by the affected families, communities, and future generations. The losses in livelihoods and income from rainfed agricultural production brought about by the prolonged droughts since 2018 are estimated at an annual average of 832 500 AR/Ha/pers. for a range of four (4) permanent crops (maize, sweet potatoes, peas, niébé) in Manombo Sud, and reach an annual average of 1 620 000 MGA/Ha/pers. in Benetse.

In general, poor nutrition is widely recognized as being at the top of the list of the most critical climate-related health impacts in Madagascar, and new climate stresses will only worsen the current situation where close to 50 percent of the population are stunted and more than 40 percent of the population anemic.

It should be underlined that Toliara II District is systematically monitored by the IPC analysis system related to acute malnutrition. Data over the past five (5) years of monitoring indicate that this Toliara II District often moves from alert (Phase 2) to serious (Phase 3), which means that at least 20 percent of households in the area are in a situation of considerable food deficit, acute malnutrition, and marginally unable to cover their minimum food needs.

Because of the entire Malagasy food system's dependence on climate, extreme weather events like extreme heat, droughts, flooding, and cyclones will lead to more shocks in food production. Increasing temperatures and CO<sub>2</sub> will cause crop failure and reduced nutritional quality in food crops in some regions. Protein and nutrient content of some cereal crops will decline with rising atmospheric concentrations of CO<sub>2</sub>.

As this research findings have confirmed, the local populations that are dependent on subsistence agriculture are particularly vulnerable. In particular, poor households that are reliant on auto-subsistence food production systems are easily disrupted by climate-related shocks and stresses. In the fishing community of Manombo Sud, the losses in auto-subsistence food production are estimated at an average of 270 000 MGA/month/pers. For the farming communities in Ranobe and Benetse, these are estimated at an average of 1 462 500 MGA/month/pers.

Shortages of food staples disproportionately impact girls and women who play an essential role in producing food, yet they are usually the last to eat when families become food insecure. The research found a deterioration in the size of rations consumed per meal. Before 2018, all respondents ate a ration considered normal at each meal; at the time of the study, this ration was reduced by 50 percent in Ankililaoka and Manombo Sud, and by 70 percent in Ranobe and Benetse. Moreover, there has been a significant change in their diet, which no longer included rice, maize and bananas at the time of the study.

On the other hand, the vast majority of respondents noted an increase in the price of basic foodstuffs (rice, cassava and maize). This increase was about 50 percent for local and imported rice, and about 35 percent for cassava and maize. The focus groups mentioned that the poorest households were less able to afford the food products. This increase in prices, at a time when poor households have limited food reserves and reduced access to work, is partly responsible for the use of erosive coping strategies (such as decapitalisation, sale of land and livestock, etc.) that constitute additional costs by themselves.

Thus, from an ecofeminist perspective, the study confirms that climate change imposes higher externalised costs on women by eroding their role in food production and stewardship of natural resources, while undermining their livelihoods and right to an adequate standard of living.

### **b) Increased women's unpaid and reproductive work**

The study results confirm that climate change can affect the quantity and accessibility of clean water, and this can impact girls and women more because they are largely responsible for water collection in their communities. In the Ranobe village for example, women and girls have to walk for 4 hours per day to fetch water.

In the Benetse village where people must buy drinking water, women living in poverty and their families are disproportionately affected by the frequent water shortages, as they had to reduce their water consumption to 25 percent of their usual volume before 2018, because of the water price hikes.

Moreover, women's unpaid and reproductive work is further increased by the collection of fuelwood, which now takes a major part of their time budget as a result of the growing forest losses due to the climate-related droughts and wildfires. Thus, women in the fishing community of Manombo Sud spend 4 hour-walk against 2 hours before 2018, while women in Benetse spend 10 hour-walk against 2 hours before 2018. It should be noted that the sale of fuelwood has become a coping strategy for the latter to address the loss of their livelihoods and income as farmers.

### **c) Intergenerational costs for future generations**

There is ample evidence that the loss of the Toliara II area's ecosystems and biodiversity is not only reducing tourism and associated economic benefits, but also the quantity or value of goods and services available to local families, communities, and future generations.

Thus, a survey on the perceived ecological changes by households conducted in some villages in the Toliara II District<sup>13</sup> showed that biodiversity loss as a result of ecological degradation or changes had significant negative livelihood impacts, notably a loss of access to natural forests resources; and reduced access to the sea or a river for fishing.

With respect to the food that they used to get from foraging in the forest, women in Ranobe and Manombo said that they have lost access to two (2) food products (*baboho* and *lamoty*) that made up their rations for four (4) days before 2018. In Benetse, women said that these food products served only as a supplement to their daily rations before 2018, but these have now become their staple foods, which are increasingly difficult to find.

The losses in income from fishing are estimated at 320 000 AR/month/pers. for women in the fishing community of Manombo Sud. The availability of fisheries resources, such as lobsters, had also deteriorated for almost all respondents, who mentioned five other fish species that are being extincted.

In addition, the women who are the guardians of traditional knowledge in their respective communities indicated that about 15 endemic species used as traditional remedies by 95 percent

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<sup>13</sup> Zaehring et al, 2024. How are large-scale extractive industries affecting progress toward the sustainable development goals in Madagascar? Perceived social-ecological impacts of mining investments.

of local communities are on the verge of extinction. This finding should be situated in a context where these 95 percent do not use public health services and resort to traditional healers in case of illness.

More generally, households observed a decrease in crop productivity, mostly attributed to a decrease in water availability. Most of those who did not feel safe linked this impact to drought.

Altogether, these losses in natural wealth and choice in a compromised environment and climate constitute significant external costs for future generations that are not easily estimated in monetary terms.

### 3.3.2. Gendered external costs from public health issues and risks

The above survey found that over the past 20 years, being healthy had become more difficult for 53 percent of households. When asked directly, almost one-quarter of households perceived mainly negative impacts of droughts on their health<sup>14</sup>. Women and girls are more susceptible to many of these health issues due to physiological differences. Climate change also increases risks related to maternal and child health, for instance increased incidence of stillbirth resulting from extreme heat.

With respect to acute and chronic respiratory infections, this study confirms that the use of fuel wood by more than 95 percent of the respondents in the district of Toliara II implies that climate change is expected to increase concentrations of air pollution from this type of fuel burning, which is responsible for approximately half of all deaths of ischaemic heart disease and contributes to approximately 30,000 deaths per year in Madagascar<sup>15</sup>. Given the existing gender division of labor, the large majority of those who are most exposed to such lethal air pollution are women.

The interviews and discussions with women's groups also revealed that the climate crisis profoundly impact their mental wellbeing. This was expressed through their testimonies about their anxiety, fear, hopelessness about the future, as well as the mild depression experienced by many of them.

### 3.3.3. External Costs from Impairment of Cultural and Social Capital

Destroyed local ecosystems include several cultural and religious sites bearing witness to the region's history, and are also the symbols of the customs and traditions still jealously guarded by the local population. As such, these have intrinsic archeological values, sacredness, or other cultural significance, which cannot be easily amended or compensated for through waged jobs or money indemnities.

In this regard, the women's group interviewed in Benetse lamented the fact that because of their climate-induced impoverishment, they no longer have the resources to take care of their King's palace, a cultural monument that they used to carefully maintain.

With respect to the changes that have occurred to customs and traditional practices, respondents in all sites indicated that the sharing of food with neighbors and visitors was no longer practiced, and that there is much less solidarity among communities. Interestingly, women in

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<sup>14</sup> Ibid.

<sup>15</sup> WHO 2015

the fishing community mentioned that they no longer wait for men to eat, while before 2018, husbands and fathers-in-law were first served, then the rest went to children.

In general, women in all the research sites felt increased tensions due to climate-related stress and competition over scarce resources, and to the increasing number of climate refugees from other locations.

#### 3.3.4. External costs of the impact of living in perpetual crisis and the inability to recover from losses

This study along with other research findings point to other high external costs from climate change, such as the loss of security, social harmony, and quality of life by the local population, who has also incurred increased expenditure of time and money to maintain its standard of living.

In this regard, the target groups' perceptions of stress vs. well-being before and after the onset of the climate crisis, were measured by a 1-10 scale whereby 1 means an extreme feeling of worry and stress, and 10 means a great feeling of happiness and well-being. For all of them, the level of perceptions went from 5-6 before 2018, down to 1-3 at the time of the study.

In addition to the depression and anxiety, women and their communities will now have to live with an increased risk of natural disasters and other undesirable events, which must also be included as part of the external costs.

## IV. ESTIMATION OF NEEDS AND PRIORITIES FOR SUPPORT

Based on the outcomes of the above analysis, the projected value of the climate-induced type of costs externalised on women are presented in the table below. These types of cost were also selected as priorities for compensation and support during the discussions with women's groups. As mentioned earlier, these are only the type of costs that could be estimated in monetary terms, and do not represent the full range of costs imposed on women.

The estimates are based on projections at the municipal level - in the communes where the four (4) study sites are located -, which is where the most disaggregated and updated socio-demographic data is available. They also use the most credible information from other sources, for example the estimates used by the international organisations that have provided humanitarian support after the cyclones.

At the national and local level, these estimates can serve as a basis for women in the target communities to reclaim their rightful and effective access to adequate adaptation support. In the framework of the international negotiations on Loss and Damage and Adaptation, these estimates can inform demands for compensation and reparations that reflect to the extent possible the losses and damage experienced by women and their communities

Those demands should always aim to fully offset the harms imposed by adverse climate-related events on the women and communities who have borne these costs, especially the non economic and intangible costs which are typically not accounted for in making the demands for compensation and reparations, although these constitute a major part of the externalised costs that have been uncovered by this study.

Type of costs	Projected value for women by affected municipality (US\$/year) <sup>16</sup>			
	<i>Manombo Sud</i>	<i>Ankililoaka</i>	<i>Tsianisiha</i>	<i>Ankilimalinike</i>
Cyclone-induced Loss and Damage <sup>17</sup>	146 049	56 021	133 175	149 309
Cost of adaptation <sup>18</sup>	31 750	82 764	34 815	31 053
Losses in income from agriculture	176 014			335 035
Losses in income from fishing	811 886			
Costs from food insecurity and malnutrition <sup>19</sup>	96 200	250 800	105 500	94 100
Costs from crop failure	685 029		4 069 285	4 069 285
Costs from increased reproductive work <sup>20</sup>	Fuelwood collection: 105 342		Water collection: 115 526	Fuelwood collection: 257 606
<b>Total estimated costs</b>	<b>2 052 270</b>	<b>389 585<sup>21</sup></b>	<b>4 458 301</b>	<b>4 936 388</b>

This implies that compensation should not be provided only by cash transfers, but include a layer of intervention measures, so that the potential inadequacy of one measure can be offset by complementary measures that act as a safety net. For example, if the costs are due to the reduced productivity of soils on farms, the compensation by cash transfers will not suffice and should contain additional provisions to relocate the affected women and their families to land areas that have not been degraded, and to provide for appropriate support for their relocation.

More attention should be given to the fact that in and by itself, risk imposes costs on society. In particular, this study shows that risk is the cause of a sizeable part of the costs from public health issues. The stress, anxiety and depression stemming from the risk of harmful climate impacts impose costs on society, whether or not the harmful impact actually materializes. In this regard, the drought insurance taken by Madagascar in 2021-2022 under the African Development Bank's flagship programme ADRiFi for sovereign drought risk transfer is clearly inadequate for its proclaimed objective to use the amount of US\$797,049 given to the Malagasy government to strengthen the resilience of part of the approximately 1,024,523 people affected by drought.

No individual measure will work to offset loss and damage as well as other external costs effectively. Instead, a set of measures is necessary to support vulnerable women and communities to withstand the range of climate impacts they might face. Furthermore, measures must also be layered to help them deal with multidimensional and compounding risks as they change and to handle the increasing intensity and frequency of climate change impacts in Madagascar over time.

<sup>16</sup> Exchange rate used : US\$1 = MGA 4 550

<sup>17</sup> Based on partial assessments by international organisations.

<sup>18</sup> Based on the amount of US\$1 billion per year announced by the Minister of Environment at the COP26.

<sup>19</sup> Based on the payout of US\$100/household provided by the World Food Programme following the drought.

<sup>20</sup> Based on the cost of labor time, i.e. the official wage of MGA 346/hour in the rural areas.

<sup>21</sup> Partial, not including the information which was not available on some types of costs.