Chile

Building agricultural resilience to climate risks

Case study
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Food and Agriculture Organization of the United Nations
Rome, 2021
Abstract

This case study describes the Republic of Chile’s approach to building agricultural resilience to natural hazard-induced disasters, particularly climate risks. It outlines two areas of strength, namely:

- Chile’s national agroclimatic risk information system – this consists of a series of interconnected platforms, agroclimatic information bulletins, tools and initiatives to monitor, identify, assess and communicate the risks, and;

- the country’s capacity development events and training, which support decision-making by agricultural stakeholders on how to avoid and reduce the adverse impacts of natural hazard-induced disasters.

Furthermore, this case study outlines a variety of financial instruments that are available to fund emergency response and recovery activities in the agricultural sector and to transfer risk through the provision of state subsidies for agricultural insurance.
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<th>Description</th>
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<tr>
<td>Agroseguros</td>
<td>Agricultural insurance committee</td>
</tr>
<tr>
<td>ASOEX</td>
<td>Chilean Association of Fruit Exporters</td>
</tr>
<tr>
<td>CEAZA</td>
<td>Center for Advanced Research on Arid Regions</td>
</tr>
<tr>
<td>CIAT</td>
<td>International Centre for Tropical Agriculture</td>
</tr>
<tr>
<td>CIREN</td>
<td>Natural Resource Information Centre</td>
</tr>
<tr>
<td>CNR</td>
<td>National Irrigation Commission</td>
</tr>
<tr>
<td>CONAF</td>
<td>National Forestry Corporation</td>
</tr>
<tr>
<td>CORFO</td>
<td>Chilean Economic Development Agency</td>
</tr>
<tr>
<td>CRAN</td>
<td>National Technical Consortium of the Agroclimatic Network</td>
</tr>
<tr>
<td>DIPRES</td>
<td>Ministry of Finance’s Budget Office</td>
</tr>
<tr>
<td>DMC</td>
<td>Chilean Meteorological Service</td>
</tr>
<tr>
<td>DRM</td>
<td>Disaster risk management</td>
</tr>
<tr>
<td>DRR</td>
<td>Disaster risk reduction</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
</tr>
<tr>
<td>FDF</td>
<td>Foundation for Fruit Development</td>
</tr>
<tr>
<td>FIA</td>
<td>Foundation for Agricultural Innovation</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross domestic product</td>
</tr>
<tr>
<td>INDAP</td>
<td>Agricultural Development Institute</td>
</tr>
<tr>
<td>MAPs</td>
<td>Participatory Agroclimatic Panels</td>
</tr>
<tr>
<td>MINAGRI</td>
<td>Ministry of Agriculture (of the Republic of Chile)</td>
</tr>
<tr>
<td>ODEPA</td>
<td>Office of Agricultural Studies and Policies</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>ONEMI</td>
<td>National Office of Emergency</td>
</tr>
<tr>
<td>PACSA</td>
<td>Agricultural Insurance Support Programme (of INDAP)</td>
</tr>
<tr>
<td>RAN</td>
<td>National Agroclimatic Network</td>
</tr>
<tr>
<td>SAG</td>
<td>Agricultural and Livestock Service</td>
</tr>
<tr>
<td>SEGRA</td>
<td>Agricultural Emergency and Risk Management Section</td>
</tr>
<tr>
<td>TIC</td>
<td>Information and Communication Technology</td>
</tr>
</tbody>
</table>
Acknowledgements

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National agriculture sectoral and disaster risk profiles

This chapter provides an overview of the Republic of Chile’s agriculture sector, its exposure and vulnerability to natural hazards, the country’s agroclimatic characteristics, the adverse impacts of climate change, the country’s disaster risk management (DRM) legislation and policy frameworks, as well as the DRM and sectoral institutional structure. It provides an overview of the identified good practices that help to reduce the impacts of natural hazards on the agriculture sector. Special emphasis is given to (a) the National Agroclimatic Risk Information System, which has been instrumental in providing agricultural stakeholders with real-time and updated agroclimatic risk data to enhance informed and timely decision-making; and (b) to the different financial instruments available to agricultural producers to catalyse proactive disaster response and recovery planning, and to help transfer risks, mainly through crop and livestock insurance.

Agriculture sectoral profile

Chile is located along the southwestern edge of South America and has a length of over 4,200 kilometres. Its most characteristic geomorphological feature consists of two large mountain ranges on either side of the intermediate depression that runs from north to south. This is where most of the country’s productive activities occur. Chile has a wide range of micro-climates, which vary from desert-like in the north to temperate and rainy in the far south. This explains the large variety of animal and plant species in Chile, and the great diversity of its crop, livestock and forestry subsectors (Ministry of Agriculture of the Republic of Chile [MINAGRI]/Office of Agricultural Studies and Policies [ODEPA], 2019).

Chile has a total of 75.6 million hectares of continental land, of which 3.1 million hectares are used for agriculture production (crops, fodder and grassland); productive and native forests comprise 2.2 million hectares and 13.2 million hectares respectively (ODEPA/INE, 2020).

According to the 2007 National Agriculture and Livestock Census conducted by INE, there are 301,376 farms in Chile, 73.4 percent of which are below 20 hectares, 19 percent are between 20 and 100 hectares, and the remaining 7.6 percent are larger than 100 hectares (MINAGRI/ODEPA, 2019). Nearly 90 percent are small-scale family farms, which contribute significantly to Chile’s agricultural production (see Box 1).

1 Agriculture sector here refers to the crop, livestock and forestry subsectors; this chapter does not discuss fisheries and aquaculture.

2 Includes all agriculture and livestock plots of land greater than 0.1 hectares, and forestry plots greater than 5 hectares.
At 9.2 percent, the agricultural share of total employment has remained more or less unchanged throughout the 2013–2018 period, reflecting the importance of agricultural livelihoods, especially in rural areas, where 25.5 percent of Chile’s overall population resides. Of the 774 000 jobs in agriculture, the majority are wage earners (65 percent), followed by self-employed (29 percent), employers (4 percent) and unpaid family members contributing to farm activities (2 percent). During the 2013–2018 period, the agricultural labour force was largely male (75 percent), although the number of women working in the sector increased by 4.7 percent, reflecting the increasing role of female employment in the crop and livestock subsectors, especially in fruit harvesting and packing (MINAGRI/ODEPA, 2019).

**Agricultural facts and figures**

Chile’s agricultural output consists mainly of: annual crops, fruit crops, wine and pisco production, (processed) fruit and vegetables, seed and bulb production, meat products, dairy products, apiculture, and forestry. The most important annual crops are wheat, oats, corn, rapes, and rice, which collectively account for 11.1 percent of the total agriculture cultivated area. In 2019, Chile had 548 113 head of cattle. Livestock production exceeded 1.5 million tonnes, with the greatest volume coming from poultry. In 2018, the primary production value was estimated at USD 2 452 million (ODEPA/INE, 2019). There were 23 milk production plants and nearly 119 small- and medium-sized cheese farms (Cruz, 2020). The annual estimated production in 2019 was 389 million litres of fluid milk and 191 tonnes of cheese and powdered milk, among other dairy products (Tapia, 2020). Chile’s national apiculture industry has grown over the last ten years
with an estimated 985 000 beehives located on 6 200 plots. The country’s annual yield in honey fluctuates from 7 000 to 11 000 tonnes per year, most of which is exported to the European Union.

Table 1 provides an overview of the country’s main crops during the 2017–2018 season.

<table>
<thead>
<tr>
<th>Productive sectors</th>
<th>Surface area (hectares)</th>
<th>Share in total production (percent)</th>
<th>Main products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forestry plantations</td>
<td>2 289 525</td>
<td>57.1</td>
<td>Radiata pine accounted for nearly 60 percent of the total surface area</td>
</tr>
<tr>
<td>Fodder</td>
<td>513 190</td>
<td>12.8</td>
<td></td>
</tr>
<tr>
<td>Cereals</td>
<td>433 315</td>
<td>11.1</td>
<td>Wheat, oats, corn, rapes, barley and rice</td>
</tr>
<tr>
<td>Fruit</td>
<td>344 281</td>
<td>8.6</td>
<td>Table grapes, walnuts, apples, cherries, avocados, olives, blueberries, European hazelnuts, oranges, kiwis, peaches, almonds</td>
</tr>
<tr>
<td>Wine production</td>
<td>146 341</td>
<td>3.6</td>
<td>Grapes for wine production</td>
</tr>
<tr>
<td>Industrial crops</td>
<td>79 181</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Legumes and tubers</td>
<td>77 243</td>
<td></td>
<td>Lettuce, onions, tomatoes, squash, carrots (for fresh consumption); corn, tomatoes, artichokes, green beans, asparagus, peas, peppers (for agroindustry)</td>
</tr>
<tr>
<td>Seeds and bulbs</td>
<td>42 511</td>
<td>1.1</td>
<td>Corn, vegetables, flower bulbs</td>
</tr>
<tr>
<td>Homestead gardens</td>
<td>16 138</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>Nurseries</td>
<td>3 103</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Flowers</td>
<td>2 176.4</td>
<td>0.1</td>
<td></td>
</tr>
</tbody>
</table>


Chile’s national gross domestic product (GDP) was USD 480 965 in 2018, with a purchasing power parity (PPP) of USD 22 999 per capita (MINAGRI/ODEPA, 2019). The agriculture, livestock and forestry subsectors have contributed an average of 2.2 percent to Chile’s GDP for each of the past four years (2014–2018) (MINAGRI/ODEPA, 2019). In 2017, the production of fruit, annual crops and vegetables together contributed more than half of Chile’s sectoral GDP, followed by equal contributions of livestock and forestry activities, as shown in Figure 1.
Agricultural trade balance: imports and exports

Due to Chile’s relatively small domestic market, the country’s strategy has been to increase its international trade in those subsectors where it enjoys a comparative advantage, namely crop, livestock and forestry. To this end, Chile has been reducing tariffs and signing free trade agreements with various countries and regions. Sector-wide exports have increased as a result, further strengthening Chile’s trade balance. In 2018, Chile’s overall crop, livestock and forestry sector trade balance amounted to USD 11 340 million, despite a deficit in the livestock sector (Table 2).

Table 2. Chile’s crop, livestock and forestry trade balance, 2018

<table>
<thead>
<tr>
<th>Sector</th>
<th>2018 trade balance (USD million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop subsector</td>
<td>6 126</td>
</tr>
<tr>
<td>Livestock subsector</td>
<td>-762</td>
</tr>
<tr>
<td>Forestry subsector</td>
<td>5 976</td>
</tr>
<tr>
<td><strong>Total crop, livestock and forestry subsectors</strong></td>
<td><strong>11 340</strong></td>
</tr>
</tbody>
</table>

Most of the crop, livestock and forestry products imported by Chile are industrial: primarily oils, refined sugar and food preparations, including grains and oilseeds. In 2018, Chile imported 520 289 tonnes of meat, with bovine products accounting for 55 percent of this amount. In terms of agricultural exports, fresh (2.9 million tonnes) and processed fruit and vegetables (1.4 million tonnes) as well as wine and spirits were among the largest exported products (860 million litres); meat exports totalled 522 117 tonnes, of which more than half was pork (MINAGRI/ODEPA, 2019).
Exposure and vulnerability to natural hazards

Given Chile’s location along the Pacific ring of fire, it is one of the most earthquake-prone countries in the world. It is also severely impacted by flooding, followed by wildfires, earthquakes, extreme temperatures, storms, volcanic eruptions, landslides and drought (Figure 2).

Figure 2. Frequency by type of disasters in Chile, 1985–2020

Earthquakes followed by floods affected more Chileans and inflicted the greatest economic loss 1985–2020 than any other disaster type (Figure 3 and Figure 4). During this period, a total of 29 major disasters were recorded in Chile: nine floods, seven forest fires, three polar cold spells, three volcanic events, three earthquakes, two tsunamis, one storm and one landslide. Combined, these affected more than 4 million people and resulted in 853 deaths (EM-DAT, 2019).

Figure 3. People affected by disaster type in Chile, 1985–2020

Impact of natural hazard-induced disasters on the Chilean agriculture sector

The 2010 earthquake – the sixth most powerful quake ever recorded – and the tsunami it caused constitute the most recent rapid-onset disaster to strike Chile. Together, they killed 560 people, destroyed several coastal villages and towns, and resulted in an estimated economic loss of USD 30 billion, equal to 18 percent of its national GDP (Economic Commission for Latin America and the Caribbean, 2010). The pair of disasters resulted in the loss of 75 percent to 90 percent of Chile’s fishery capacity and damaged nearly 300,000 hectares of agricultural land in the Bío Bío and Maule regions (EM-DAT, 2019). Nearly 70 percent of irrigation capacity was destroyed in the earthquake-damaged region (Burgoine, 2010). Blocked roads and power outages affected the harvest, storage and transport of agricultural products inside and outside of Chile. Damage to its crop, livestock and forestry subsectors amounted to 2 percent (USD 601 million) of Chile’s total damage (FAO, 2017).

Drought has also substantially affected the agriculture sector, particularly the “mega drought” of 2010–2015 (Box 2). During 2008–2019, drought was the most recurrent event – as evidenced by the number of agricultural emergency declarations that were issued by the Ministry of Agriculture – followed by earthquakes, frosts, fires and heavy rains/flooding (Figure 5) (MINAGRI, 2018).
Box 2. Mega drought of 2010 to 2015 and its impact on agriculture in Chile

The longest and most extensive drought in Chile’s history occurred during the 2010–2015 period. While the total magnitude of the disaster is still unknown due to insufficient damage and loss data, this “mega drought” significantly reduced Chile’s crop, livestock and forestry production. In order to estimate its impact, reference is made to public spending on emergencies.

A significant proportion of the country (from the Coquimbo to the Araucanía regions) experienced a precipitation deficit of 30 percent during the 2010–2015 period. Climate change scenarios indicate that the 2010–2015 situation could become the norm in the near future, resulting in an imbalance between fresh water supply and demand in Chile’s southern regions. This means that the cultivation of certain crops should be shifted to the south, which would in turn lead to less land being sown with grains, such as wheat. This is an important matter for Chile, which has already seen its area of wheat production cut by half, from 400 000 to 200 000 hectares, over the last 20 years.

Several agricultural agencies were involved in addressing this situation, including the Agricultural Emergency and Risk Management Section of the Ministry of Agriculture (SEGRA/MINAGRI), which set up an Agroclimatic Observatory for drought monitoring and issued early drought-related warnings. The Agricultural Development Institute (INDAP) supported the co-financing of investments in irrigation, including enhancement of existing and new irrigation systems. Together with the Agricultural and Livestock Service (SAG), INDAP implemented the “Incentives for the agro-environmental sustainability of the agricultural land programme”, to help recover degraded land as part of a range of interventions intended to prevent the adverse impacts of droughts. The National Forestry Corporation (CONAF) specifically promoted afforestation and other soil interventions, such as the establishment of vegetation covers and crop rotation for the reduction and control of desertification and land degradation. The National Irrigation Commission (CNR) provided subsidies for the construction and private repair of irrigation and drainage works and to encourage application of new irrigation technologies to improve water use efficiency.


The data presented in Figure 5 represents agricultural emergency declarations issued by MINAGRI.³ In 2008, 2015 and 2019 drought was declared as an agricultural emergency by 219, 199 and 119 municipalities respectively. In 2010, an earthquake affected 239 municipalities. In 2013 and 2017, frost and forest fires adversely impacted 119 and 75 municipalities, respectively. Droughts, forest fires and other types of emergencies have significant adverse impacts on smallholder farmers due to their limited coping capacities.

³ Those issued by INDAP are not included in the analysis as they do not consider the same type of data.
The majority of the municipalities that declared agricultural emergencies during the 2009–2019 period was due to water deficit/drought as shown in Figure 6.
However, it should be noted that the number of municipalities that declared agricultural emergencies does not necessarily reflect the severity of each emergency. For example, the 2010 earthquake resulted in 239 municipalities involved in one single emergency declaration. That is, despite its severity and spread, it counts as one single emergency. Meanwhile, a small local event, such as a landslide that only affected one municipality in the Los Lagos region, also counts as one.

In addition, the same drought can lead to multiple emergency declarations due to the slow-onset nature of the event. Existing databases do not provide sufficient information to group emergency declarations covering a prolonged drought. In general, at present it is difficult to determine which municipalities in each region are more frequently affected by agricultural emergencies – and affected by which type of hazards – without the risk of double counting single events. This challenge exists as there can be several back-to-back emergency declarations, both from MINAGRI and INDAP for one single event. Each institution manages its own databases and neither of them specifically examines this issue.

Aside from droughts, forest fires have also substantially affected agricultural activities, especially since 2010, when so-called “mega fires” started to become more frequent. In summer 2017, for instance, forest fires affected more than 500,000 hectares and the cost of extinguishing them exceeded USD 350 million, which is the highest figure ever recorded for fighting forest fires (Center for Climate and Resilience Research, 2019).
Public and private expenditures on emergency response in the agriculture sector

Analysing public spending on emergency response helps to better understand the economic impact of disasters on Chile’s agriculture sector. During the 2008–2017 period, it is estimated that Chile’s total agricultural emergency response expenditures amounted to USD 160 million. During this period, the costliest public emergency responses were for drought, followed by earthquakes, forest fires, volcanic eruptions, snowstorms, heavy rains and frosts (Figure 7).

Figure 7. Chile’s share of agricultural emergency response expenditures by hazard type, 2008–2017

Moreover, studies about agricultural insurance products conducted by Agroseguros – an entity created by the Chilean Economic Development Agency (CORFO) to promote agricultural insurance – reveal that the greatest insured risks are frosts and heavy rains (Figure 8). Notably, while the government spends most on drought, this disaster type ranks only third in terms of both the share of insurance products purchased by farmers and the share of insurers’ pay outs to cover actual damage and loss (Figure 8 and Figure 9). This is due to the fact that drought insurance is available only in the dryland sector, and the slow-onset nature of drought makes it difficult to identify the trigger(s) and when to exactly declare a drought (FAO, 2017).

MINAGRI has made progress in setting up a system to assess damages and losses caused by disasters in different sectors, in order to comply with the 2015–2030 Sendai Framework for Risk Reduction and the Sustainable Development Goals.
Figure 8. Percentage of insurance products bought from insurance companies per hazard type, 2000–2015


Figure 9. Percentage of pay outs by insurance companies per hazard type, 2000–2015

Chile’s disaster risk management legislation, policy and institutional framework

Chile’s National Civil Protection System (SNPC) consists of various technical and sectoral agencies and ministries, regional authorities, technical and academic institutions, as well as organized civil society at the national and territorial levels. SNPC’s actions are coordinated by the Ministry of Interior and Public Security’s National Office of Emergency (ONEMI) (Ministry of Interior, 1974). ONEMI’s mission is to plan, coordinate and carry out prevention, mitigation, alert, response and rehabilitation activities to safeguard individuals, their property and the environment.

In 2008, ONEMI established regional offices in each of the country’s 16 regions to provide regional, provincial and local governments the technical and operational support they need (ONEMI, 2007). To ensure that the SNPC is operating efficiently and effectively nationwide, ONEMI also created civil protection and emergency operations committees at national, regional, provincial and municipal levels. Representatives from MINAGRI, and other public and private agencies whose mandates contribute to civil protection, participate in these committees.

In response to lessons learned from the 2010 earthquake and tsunami, a proposal for a new DRM regulatory framework and institutional setup was submitted to Chile’s Congress. The framework would create a new National Civil Protection Agency with more responsibilities and resources, replacing ONEMI. After almost ten years, the proposed framework has still not been approved. However, since 2010, ONEMI and the Government have been implementing a series of measures aimed at strengthening the SNPC, intensifying its focus on improved alert and response systems, preparedness, and the mainstreaming of DRM into development planning at all government levels. This has resulted in a more proactive DRM approach across sectors.

For instance, in 2015, Chile established a National Disaster Risk Reduction (DRR) Platform, as recommended by the Sendai Framework for Disaster Risk Reduction 2015–2030, of which Chile is a signatory member state (Ministry of Interior and Public Security, 2016). This multi-sectoral platform brings together over 120 stakeholders – including public agencies, private sector, academia, scientific technical bodies, armed forces, UN agencies, civil society and volunteer organizations – to better coordinate the country’s disaster risk reduction activities. The Ministry of Agriculture is a member of several of the platform’s working groups, such as those that focus on: i) institutional strengthening; ii) improving the early warning and monitoring system; iii) enhancing a culture of prevention; iv) promoting insurance; and v) strengthening disaster preparedness for effective
response. Each working group elaborates and implements an annual work plan. Specific agricultural DRR actions are, however, not included in these work plans.

Chile’s relevant DRM policy frameworks build on its 2002 National Civil Protection Plan (Ministry of Interior, 2002). Although non-binding for the various national, regional, provincial and local agencies involved in the SNPC, the plan nevertheless provides guidance for their respective disaster risk management actions and encourages adjustment of their regulatory and institutional frameworks. It has been instrumental for ensuring that civil protection actions are in line with sectoral, institutional and territorial needs. It has incentivized several ministries, including MINAGRI, and public and private institutions to better define their specific DRM roles, responsibilities and actions in line with their overall mandates and expertise.

In 2016, the government adopted a new National Disaster Risk Management Policy (Ministry of Interior and Public Security, 2016). This cross-sectoral policy serves as a reference framework for public, scientific, academic and civil society organizations and includes DRM goals and strategic priorities that are in alignment with international frameworks, such as Sendai and the 2030 Agenda for Sustainable Development. It provides guidelines for setting up ongoing disaster risk reduction and emergency response processes in Chile and includes climate change as a strategic priority. Agriculture, however, is not considered a priority in the policy, and there are no specific measures included for the sector. The sector is also not represented in the National Emergency Committees (COE), where the only sectoral ministries included are those of transport and telecommunications, energy, and health. Nevertheless, the policy does establish MINAGRI as a member of several working groups of the National DRR Platform.

As an instrument to operationalize the policy, in 2016, Chile also adopted the 2015–2018 National Disaster Risk Management Strategic Plan, which outlines specific actors, programmes, actions, and timeframes involved in the National Disaster Risk Management Policy (Ministry of Interior and Public Security, 2018). This plan facilitates the adoption of a disaster risk management approach. It prioritizes actions and promotes the involvement of various sectors at the national and territorial levels in designing and implementing effective disaster-risk reduction initiatives. As a member of the SNPC, MINAGRI was actively engaged in defining the plan’s strategic objectives and activities under four of the five priority pillars: institutional strengthening (pillar 1), strengthening early warning and monitoring systems (pillar 2), promoting a culture of prevention and insurance (pillar 3), and reducing underlying risk factors (pillar 4).
Roles and responsibilities of the agriculture and livestock subsectors in disaster risk management

The Chilean Ministry of Agriculture is responsible for promoting and coordinating the country’s crop, livestock and forestry activities within the context of sustainable natural resources management. Legally, MINAGRI does not have explicit disaster risk management responsibilities. However, it has an administrative department called Agricultural Emergency and Risk Management Section (SEGRA), which is responsible for monitoring and issuing agricultural emergency and risk warnings, conducting studies, generating technical information, providing training opportunities, and designing and implementing emergency response actions.

SEGRA participates in the National Agroclimatic Risk Management System established under Chile’s 2009 National Climate Change Action Plan (Ministry of Agriculture, 2018a). It coordinates and provides technical assistance to design and implement regional agricultural emergency and agroclimatic risk management plans, which have been developed for each region. Agroseguros also coordinates prevention and monitoring actions (please refer to the Agricultural Insurance Programme section) as shown in Figure 10.

Figure 10. Organizational chart of Chile’s Ministry of Agriculture, 2021

SEGRA serves as the technical secretariat of the Ministerial Technical Advisory Body for Agricultural Emergencies and Risk Management whose membership also includes public and public-private entities that are part of the Ministry of Agriculture, including:
• **Office of Agricultural Studies and Policies (ODEPA)** – The office coordinates the Intra-Ministerial Technical Committee on Climate Change, which, in turn, advises the Minister of Agriculture in formulating a ministerial strategy to enhance adaptation and mitigation to climate change in the crop, livestock and forestry subsectors. ODEPA is the focal point of the Ministry of Agriculture for the Ministry of the Environment.

• **Natural Resource Information Centre (CIREN)** – A private non-profit corporation that collaborates with MINAGRI in conducting risk assessments for institutions that request it. It also manages Chile’s largest georeferenced database with information on soil types, water resources, climate, fruit and forestry.

• **Agricultural Research Institute (INIA)** – The main sectoral research institute that provides ongoing support to the Agroclimatic Observatory. It has several weather stations (for research) and is a member of the National Agroclimatic Network (RAN). It also has agreements with the Ministry to conduct monthly agroclimatic risk analyses both nationally and for each of the regions.

• **Foundation for Agricultural Innovation (FIA)** – FIA collaborates on strengthening and optimizing the RAN and its AGROMET web portal through earmarked funding for expanding the network of weather stations and enhancing the dissemination of agroclimatic information.

• **Agricultural Development Institute (INDAP)** – INDAP focuses on family farming and related organizations, among others, it co-finances technical assistance and services to them. It also contributes to follow-up actions after agricultural emergencies by providing agroclimatic risk management training to farmers and agricultural extensionists and by developing disaster risk reduction programmes.

• **National Irrigation Commission (CNR)** – CNR implements irrigation studies, projects and programmes within the context of water scarcity and sustainably increasing the total irrigated area in the country.

• **Agricultural and Livestock Service (SAG)** – This is the official body responsible for supporting development of the crop, livestock and forestry subsectors, through the protection and improvement of animal and plant health.

• **National Forestry Corporation (CONAF)** – This corporation contributes to the sustainable development and management of Chile’s forest ecosystems, including reducing the adverse impacts of climate change on these ecosystems.

An overview of the different DRM instruments and initiatives developed and led by MINAGRI in collaboration with the above-mentioned institutions is provided in Table 3.
Table 3. Main DRM instruments and initiatives of Chilean crop and livestock subsectors

<table>
<thead>
<tr>
<th>DRM instrument or initiatives</th>
<th>Starting year</th>
<th>Lead institution</th>
<th>Other collaborative institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop, livestock and forestry insurance</td>
<td>2000</td>
<td>Agroseguros</td>
<td>INDAP</td>
</tr>
<tr>
<td>Risk management information and early warning system</td>
<td>2009</td>
<td>SEGRA/MINAGRI</td>
<td>INIA, DMC, RAN</td>
</tr>
<tr>
<td>Education and training for agricultural producers</td>
<td>2009</td>
<td>SEGRA/MINAGRI</td>
<td>INDAP, DMC, FIA</td>
</tr>
<tr>
<td>Conducting risk assessments</td>
<td>2010</td>
<td>SEGRA/MINAGRI</td>
<td>INIA, CIREN</td>
</tr>
<tr>
<td>Implementation of agricultural risk management projects</td>
<td>2011</td>
<td>SEGRA/MINAGRI</td>
<td>INIA, INDAP, SAG, CNR, CONAF</td>
</tr>
<tr>
<td>Agricultural emergency management system</td>
<td>2017</td>
<td>SEGRA/MINAGRI</td>
<td>CIREN</td>
</tr>
<tr>
<td>Development of damage and loss assessment methodologies</td>
<td>2018</td>
<td>SEGRA/MINAGRI</td>
<td>INDAP</td>
</tr>
<tr>
<td>MINAGRI’s emergency operations plan</td>
<td>2019</td>
<td>SEGRA/MINAGRI</td>
<td>Agroseguros, ONEMI</td>
</tr>
</tbody>
</table>

Source: FAO’s compilation with inputs from SEGRA’s staff.

SEGRA/MINAGRI established an Emergency Operations Plan that is linked to the National Civil Protection Plan (MINAGRI, 2019; Ministry of Interior, 2002). The Emergency Operations Plan helps to coordinate response and recovery mechanisms that will enable farmers to quickly recover and resume their economic activities following a disaster. It is also linked to the National Emergency Plan adopted in 2017, which outlines disaster response procedures and actions through the National Civil Protection System, including for the Ministry of Agriculture (ONEMI, 2017). This plan provides technical recommendations to reduce the adverse impacts of disasters by analysing agro and meteorological data and impacts on the sector by region. It also develops and implements action plans that help minimize economic loss in agriculture, with an emphasis on supporting smallholder farmers.

SEGRA/MINAGRI has designed an Agricultural Emergency Management Platform.⁵ Within the context of the Sendai Framework and Chile’s responsibility to report on the C-2 Indicator (assessing “Direct agricultural loss attributed to disasters”), this platform is expected to include a special operational module to calculate damage and loss to the crop, livestock and forestry subsectors; it will also be used to issue warnings. This platform is a significant development that will allow the Ministry and other sectoral actors to inform policies and actions with robust evidence to effectively build a resilient agriculture sector as well as complying with international reporting commitments.

⁵ See for more information www.gestionemergencias.minagri.gob.cl/home.
Inter-sectoral coordination mechanisms

Besides SEGRA, there are other national and regional agricultural bodies that support the Ministry’s interaction with other public and private organizations, such as the Ministerial Technical Advisory Committee for Agricultural Emergencies and Agricultural Risk Management and the Regional Advisory Commissions for Integral Agricultural Risk Management (CREA) (MINAGRI, 2008, 2016, 2018b).

The Ministerial Technical Advisory Committee establishes criteria and protocols for declaring agricultural emergencies. It follows up on the Ministry’s response actions that address the needs of farmers affected by disasters, develops regionally adapted ministerial plans to reduce post-disaster damages, and addresses the budgetary implications. It also makes recommendations to the Ministry of Agriculture regarding prevention measures to reduce the adverse impacts of disasters on crop, livestock and forestry activities.

CREA plays a key role in regional coordination between state agencies and private sector stakeholders. There is one commission for each of Chile’s 16 regions, and each one is led by their Regional Ministerial Secretary (SEREMI), who serves as MINAGRI’s representative. CREA provides the regional authority with technical assistance for the following issues:

- Regional plans for integrated risk management for the crop and livestock subsectors, and guidelines for developing regional contingency plans for these subsectors.

- Regional ministerial coordination for the promotion and implementation of integrated risk management instruments, such as agricultural insurance.

- Regional coordination with other state agencies, special regional bodies and the private sector.

- Procedures to assess requests from MINAGRI for declaring agricultural emergencies.
Disaster risk management good practices

Chile’s approach to agriculture disasters has evolved over time and it now includes more robust mechanisms and instruments to enhance planning, prevention, mitigation and preparedness for response actions involving the various agriculture agencies and other relevant stakeholders. In the following section, two areas of strength will be highlighted: Chile’s national agroclimatic risk information system, and the different financial instruments available to support agricultural producers in Chile and transfer their risks, namely, through agricultural insurance, especially for the crop and livestock subsectors. These examples demonstrate the wide range of disaster risk management actions Chile uses to build resilience in the agriculture sector.

National Agroclimatic Risk Information System

MINAGRI collaborates with various other sectoral agencies, public institutions, private sector, and academic and scientific organizations. As a result of these partnerships, MINAGRI has developed and fine-tuned a series of interconnected platforms, tools and initiatives to monitor, identify, assess and communicate agroclimatic risks. This informs decision-making and helps coordinate agroclimatic risk management actions for the Chilean crop and livestock subsectors. This system for the provision of agroclimatic risk information is described in the following sections.

Data generation and coordination platforms

National Agroclimatic Network (RAN) – a collaborative platform for agriculture

At present, Chile’s agroclimatic risk management system is based on information provided by the National Technical Consortium of the Agroclimatic Network (CRAN). It is overseen by a steering committee, which includes representatives from MINAGRI and FIA. CRAN is advised by a Technical Committee that consists of network technicians and representatives from MINAGRI and FIA. CRAN is the governance body of RAN. The overall goal of RAN is to provide free access to reliable agroclimatic information in a timely manner for informed decision making at all levels. Its core objectives include setting up and maintaining a network of automatic weather stations to provide tailor-made data for agriculture.

Dissemination of the information is managed through MINAGRI’s Agromet web-portal, ensuring availability and access to agroclimatic information about the areas where agricultural activity is important (please refer to the section on agroclimatic information bulletins). Members of RAN consist of representatives of

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the various academic, public and private institutions that have automatic weather station networks, such as the Foundation for Fruit Development (FDF), INIA, Vinos de Chile, Chilean Association of Fruit Exporters (ASOEX) and the Center for Advanced Research on Arid Regions (CEAZA) as shown in Table 4.

Table 4. Members of the National Agroclimatic Network (RAN), 2018

<table>
<thead>
<tr>
<th>Network</th>
<th>Type</th>
<th>Number of partners</th>
<th>Number of automatic weather stations (2017)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDF</td>
<td>Private</td>
<td>33</td>
<td>173</td>
</tr>
<tr>
<td>INIA</td>
<td>Public</td>
<td>1</td>
<td>142</td>
</tr>
<tr>
<td>Vinos de Chile</td>
<td>Private</td>
<td>74</td>
<td>46</td>
</tr>
<tr>
<td>ASOEX</td>
<td>Private</td>
<td>138</td>
<td>-</td>
</tr>
<tr>
<td>CEAZA</td>
<td>Private non-profit foundation</td>
<td>5</td>
<td>37</td>
</tr>
</tbody>
</table>


RAN currently operates a total of 409 weather stations, of which 398 are automatic weather stations, across Chile’s main agricultural regions, including Coquimbo, Valparaiso, Metropolitan, O’Higgins, Maule, Ñuble, Bio Bio, La Araucania, Los Ríos and Los Lagos, where the majority of agricultural commodities are produced.  

The automatic weather stations gather real-time weather information (see Box 3) through sensors that transmit the data via satellite to servers that process and upload it to Agromet’s web portal (please refer to the section on agroclimatic information bulletins).

Box 3. Meteorological variables reported by RAN and AGROMET

- Average air temperature [°C]
- Maximum temperature [°C]
- Minimum temperature [°C]
- Wind direction [degrees]
- Average relative humidity [percent]
- Hourly precipitation [mm]
- Maximum wind speed [m/s]
- Maximum solar radiation [W/m2]
- Atmospheric pressure [mbar]


See for more information [www.agromet.cl/que-es-agromet](http://www.agromet.cl/que-es-agromet).

The Agromet web portal is accessible via [www.agromet.cl](http://www.agromet.cl).
To support CRAN, MINAGRI annually transfers funds within the context of an agreement under which CRAN commits to continuously operate RAN, deliver updated information on the Agromet web portal, and develop indicators that are of interest to agriculture (MINAGRI/FDF, 2018). Despite the recent decrease in the Ministry’s funding to RAN, from USD 481 000 in 2013 to USD 421 000 in 2019, it is expected that it will continue to financially support its operational costs (Ministry of Finance’s Budget Office [DIPRES], 2018).

Online information dissemination: the Agromet web portal

The Ministry of Agriculture established the Agromet web portal in 2013. This is its main information portal, which provides farmers and other agriculture stakeholders with real-time and free access to information from RAN for their area. Agromet is an essential resource for farmers as it provides the most relevant information in a reliable and quality form. In addition to the real-time data, the network provides five-day forecasts related to hazardous events that may threaten the main fruit trees, crops (for example, rice, wheat, grassland) and livestock (sheep, bovines) in different Chilean regions. The main features of the Agromet site include:

- a map of all automatic weather stations, allowing users to select their area of coverage;
- automatic identification of user location so that the nearest or most relevant automatic weather station can be proposed;
- allows users to select a specific automatic weather station as their “favourite”; and
- access to the frost forecast system,\(^9\) which provides frost warnings directly to the registered user’s e-mail address at 21:00 and 23:00, and warnings 12 to 24 hours prior to other extreme events, such as heavy rains and storms.

In 2015, CRAN published a user’s guide for the Agromet web portal,\(^10\) making it easier for Chilean farmers to access the site’s information and all other RAN-consolidated data. Since its launch, the web portal has undergone continuous updates and improvements. On average, it attracted 13 000 users per year during 2013–2017, with a cumulative total of 308 471 visits over that period. At present, 60 percent of Agromet’s users are in the Santiago metropolitan region and account for 70 percent of session participants or portal inquiries (MINAGRI/FDF, 2018). Thus, raising awareness of the portal among farmers in other regions is one of Agromet’s greatest challenges. This requires increasing outreach and training activities at subnational level.

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\(^9\) For more information see https://www.agromet.cl/node/472.

\(^10\) The Agromet web portal user’s guide can be accessed via https://issuu.com/lilianavillanuevanilo/docs/guia_de_usuario_agromet.
Although Agromet already consolidates information from all agroclimatic member networks, several also have their own platforms. Agromet should, therefore, enhance its collaboration with those networks and, where appropriate, link to their services from its platform. These independent networks include:

- INIA’s Agrometeorological website, https://agrometeorologia.cl/;

Hazard-specific online platform: Agroclimatic Risk Observatory Platform

Created in 2012, the Agroclimatic Risk Observatory Platform,\(^{11}\) provides an early warning and monitoring system for drought. It also identifies the areas most affected by drought and helps users prioritize their response actions. The platform provides access to free online information,\(^{12}\) including a data library and maps with information on: i) El Niño-Southern Oscillation situation;\(^{13}\) ii) drought monitoring; iii) historical data from each automatic weather station where available; iv) drought vulnerability maps; and v) drought warnings. While the data library is available to all users, it is not so easy to use as users must have average to advanced programming and mathematical modelling skills to use its features.

One of the platform’s most used features is its drought monitoring tool,\(^{14}\) which automatically generates maps to identify meteorological, hydrological and agricultural droughts. Moreover, it offers real-time information from other networks, such as RAN, INIA, DMC, SEGRA/MINAGRI, and the General Directorate of Water. Annual users of the platform fluctuated from between 1 300 to 3 000 during the 2014–2017 period, which is relatively low compared to Agromet’s 13 000 users each year and considering the high prevalence of drought that impact Chile’s agricultural areas (Sub Departamento IMP, 2017).

Agroclimatic information bulletins

Agroclimatic Situation Bulletin (Coyuntura agroclimática)

SEGRA/MINAGRI has been publishing Coyuntura agroclimática – a monthly electronic bulletin (10–15 pages) – since 2012. It reports on meteorological changes and their impact on the crops, livestock and forestry subsectors. It also contains a drought outlook section that summarizes current meteorological,

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\(^{11}\) The Agroclimatic Risk Observatory Platform is accessible via www.climatedatalibrary.cl/IMP-DGIR/maproom/.

\(^{12}\) The data library and maps can be accessed via www.climatedatalibrary.cl.

\(^{13}\) During El Niño-Southern Oscillation episodes, the normal patterns of tropical precipitation and atmospheric circulation are disrupted, hence triggering extreme climate events around the globe: droughts, floods and affecting the intensity and frequency of hurricanes. Agriculture is one of the main sectors that can be severely affected by the El Niño phenomenon (FAO, 2014).

\(^{14}\) The Agroclimatic Risk Observatory Platform’s drought monitoring tool can be accessed via www.climatedatalibrary.cl/UNEA/maproom/Monitoring/.
hydrological and agricultural data, providing information on precipitation nationwide, river flow deficits and reservoir status. Moreover, it indicates prospects for the crops, livestock and forestry subsectors. While it does include detailed information on the impact of adverse events when assessments are available – namely, mega drought, forest fires, landslides, etc. – this bulletin does not provide agricultural advice or recommend practices and technologies to help reduce the impacts of natural hazards. Instead, it focuses mainly on hydrometeorological parameters and provides a three-month forecast.

Initially, the bulletin was based on data from the Agroclimatic Risk Observatory Platform. At present, however, it is also fed by RAN data available on the Agromet web portal, extending the reach of that information beyond Agromet’s users. *Coyuntura agroclimática* is e-mailed to over 5 000 contacts. It is also published on various agriculture and livestock sector websites and posted on social media (Twitter: @DGIR_ and @Agromet_RAN).

**Agroclimatic Monitor (Monitor Agroclimático)**

In 2013, SEGRA/MINAGRI started to publish the *Monitor Agroclimático* – a two-page monthly bulletin. It contains news about agroclimatic risks, along with summarized and consolidated information on various matters, such as: precipitation, drought monitoring, El Niño monitoring and forecasts, hydrological updates on the flow rates of most major rivers and reservoirs, and updated forest fire information. Most of the information contained in this bulletin is also reported, albeit in greater depth, in the *Coyuntura agroclimática*. The *Monitor Agroclimático* is e-mailed monthly to over 5 000 individuals who follow the agriculture sector, such as government staff, INDAP consultants, academic and research staff, and teachers and students of agricultural schools. The bulletin is also published on Agromet and other websites.

**National and Regional Agroclimatic Risk Analysis Bulletins for Key Fruit Species, Crops, and Livestock (Boletínes Nacional y Regionales de Análisis de Riesgos Agroclimáticos para las Principales Especies Frutales y Cultivos y la Ganadería)**

The e-bulletins *Boletínes Nacional y Regionales de Análisis de Riesgos Agroclimáticos para las Principales Especies Frutales y Cultivos y la Ganadería*, published by INIA on a biweekly and monthly basis, contain national and regional meteorological data and information on water availability in the regions’ most important rivers and reservoirs. They also outline specific agricultural practices that can help prevent and mitigate the adverse impacts of natural hazards on the main crop, fruit and livestock production activities in each of Chile’s diverse regions (the trans-Andean foothills, intermediate depression, interior drylands, coastal drylands and so on). The National Bulletin is usually shorter than the more detailed regional bulletins, because it summarizes the regional data and recommendations regarding

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15 During the 2015–2018 period, the Agroclimatic Monitor was not published.
the main fruit, crop and livestock species by macrozone.¹⁶ Both the national and regional bulletins are posted on Agromet and the websites of SEGRA/MINAGRI and INIA.¹⁷ Interested stakeholders can register to receive them by e-mail.

Capacity development training and awareness raising events

Seasonal outlook event (Panorama estacional)

Panorama estacional is a national event that has occurred at least twice a year since 2014. It takes place at MINAGRI’s Santiago headquarters and is broadcast live via video conferencing. The purpose is to assess the country’s overall climate situation and discuss the upcoming seasonal forecast and irrigation needs. It raises participants’ awareness of DRR and climate change adaptation measures that can be applied during the fall-winter and spring-summer seasons. Participants include experts from RAN’s member organizations, other agro agency representatives, specialists from academia and the private sector, as well as staff from INDAP and the Regional Ministerial Secretaries of the Ministry of Agriculture (SEREMIs), including their emergency focal points.

Training and workshops for farmers and extensionists

MINAGRI and other RAN members have organized outreach and training activities to increase awareness and use of the various information platforms and other resources available on agroclimatic risk management. These long-standing initiatives include the following:

- **Agromet Website Applications by the National Agroclimatic Network** was a month-long e-learning course that provided information on how to interpret and use RAN’s meteorological information. It was offered to professionals, technicians and others employed in the crop and livestock subsectors. A total of 301 people participated in this e-course during the 2015–2018 period.

- **Managing Climate Risk Related to the Agriculture, Livestock and Forestry Sector** is an e-learning course designed to promote use of DRM concepts in agriculture and highlight the various tools developed by MINAGRI and RAN. This e-course has been offered since 2012 to professionals and technicians working in the Chilean agriculture sector and to individuals working in outreach and capacity building, especially within the context of drought. A total of 1 810 people participated in this e-learning course during the 2012–2018 period.

- **Meteorology, a tool for agriculture** workshops were offered in 2019 by the DMC’s Agricultural Meteorology Section as part of an INDAP-DMC agreement. During the one-day workshop, smallholder farmers, in particular youth and women, learned

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¹⁶ Macro-zones: norte grande, norte chico, central, south-central, south, southernmost (austral).
¹⁷ The national and regional agroclimatic risk analysis bulletins for key fruit species, crops and livestock can be accessed via www.inia.cl/agroclimatico/.
about the various components of meteorology and how to use this information for their farming activities. The workshops also promoted the exchange of knowledge and experiences on the implementation of practices and technologies that help prevent or reduce adverse impacts of extreme weather events on crops and livestock. A total of 341 people participated in these workshops, which were held in 16 communities throughout the Coquimbo and Araucanía regions (Table 5).

Table 5. Meteorology, a tool for agriculture workshop, 2019

<table>
<thead>
<tr>
<th>Region</th>
<th>Communities</th>
<th>Number of workshop participants</th>
<th>Crops and livestock considered in workshops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coquimbo</td>
<td>Illapel</td>
<td>20</td>
<td>Avocados, fruit trees, vegetables, vineyard, goats and poultry.</td>
</tr>
<tr>
<td></td>
<td>Monte Patria</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Valparaíso</td>
<td>San Felipe</td>
<td>17</td>
<td>Walnuts, grapes, fruit trees, vegetables, flowers and bees</td>
</tr>
<tr>
<td></td>
<td>Quillota</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Metropolitan</td>
<td>Colina</td>
<td>22</td>
<td>Walnuts, potatoes, fruit trees and vegetables.</td>
</tr>
<tr>
<td></td>
<td>Curacavi</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>O’Higgins</td>
<td>Las Cabras</td>
<td>30</td>
<td>Vineyards, wheat, corn, fruit trees, nectarines, apples, pears, kiwis and vegetables</td>
</tr>
<tr>
<td></td>
<td>Santa Cruz</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>El Maule</td>
<td>Cauquenes</td>
<td>27</td>
<td>Vegetables, strawberries and bees</td>
</tr>
<tr>
<td></td>
<td>Curepto</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Ñuble</td>
<td>Coelemu</td>
<td>17</td>
<td>Vineyards, vegetables and fruit trees</td>
</tr>
<tr>
<td></td>
<td>Quirihue</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Bio Bío</td>
<td>Florida</td>
<td>27</td>
<td>Vineyards, vegetables and fruit trees</td>
</tr>
<tr>
<td></td>
<td>Yumbel</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Araucanía</td>
<td>Freire</td>
<td>27</td>
<td>Cereals, tomatoes, vegetables, asparagus, fruit trees, strawberries, raspberries, wheat, quinoa, cattle and sheep</td>
</tr>
<tr>
<td></td>
<td>Angol</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Dirección Meteorológica de Chile, 2019.

Due to the COVID-19 pandemic, the three workshops scheduled for 2020 were cancelled. Because extension officers are considered external consultants, they are not entitled to participate in trainings offered by MINAGRI or other agricultural services. This limits their ability to acquire and share the most current risk management information with the farmers that they serve. Also, supporting farmers to manage disaster risk is not formally acknowledged as a core objective of their work.
Interest and action groups

Participatory Agroclimatic Panels

The most recent component of Chile’s National Agroclimatic Risk Information System is the Participatory Agroclimatic Panels (MAPs). These panels are multi-actor technical working groups established by MINAGRI. They bring together meteorologists, agricultural experts and technicians, other specialists, farmer representatives and local stakeholders to develop agroclimatic information. These working groups assess hydrometeorological information and the potential implications on agricultural production, mainly crops and livestock. For instance, the groups advise on the best use of new or adjusted farming practices in view of actual weather forecasts and seasonal outlooks. This results in localised and context-specific recommendations to reduce damage and loss in agricultural production. The MAPs follow a model implemented in Colombia with support from the International Centre for Tropical Agriculture (CIAT) and FAO. This model is currently being scaled-up across Latin America and the Caribbean.

The first panel occurred in 2018 in the Marchigüe municipality of the O’Higgins region. Since then, there have been 13 sessions across the three established MAPs: MAP Marchigüe-La Estrella (nine panels); MAP Pumanque-Lolol (three panels) and MAP Navidad-Litueche (one panel). These panel discussions among farmers and experts increase farmers’ access to, and understanding of, agroclimatic information and how best to apply it to their own crop production. Participants learn how to identify suitable DRR practices and what they can do to mitigate the adverse impacts of various hazards. All this information is compiled in an agroclimatic bulletin prepared and published by the panel members. Additional bulletins are developed based on seasonal forecasts and specific weather parameters (for example, rainfall, temperature, frost, wind speed, and so on). MAP Marchigüe-La Estrella has published three such bulletins so far. It is expected that other participatory panels will be established in the Paredones and Pichilemu municipalities located in the O’Higgins region. These MAPs will be established under the “Improving Climate Change Resilience of Small-Size Farming in the O’Higgins Region” project, funded by the Adaptation Fund with contributions by CIAT.

There are certain constraints among the information services and products available to farmers to reduce the impact of natural hazards on agriculture. For example, most of these information services and data platforms require access to internet, registration to an institutional e-mail distribution list and some IT skills to understand, analyse and use the services it offers. These barriers contribute to the fact that the data platforms are primarily accessed by users located in the Santiago area. Moreover, the awareness raising and training events organized by

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18 Establishing these participatory agroclimatic panels were identified as a priority for the implementation of the Community of Latin American and Caribbean States’ (CELAC) Regional Strategy for Disaster Risk Management for the Agriculture Sector and Food and Nutrition Security in Latin America and the Caribbean 2018–2030.
SEGRA/MINAGRI have focused on the building of capacities among professionals, technical staff, and experts from RAN’s member organizations, academic institutions and farmers, among others. Finally, extension officers are not direct recipients of the training, which limits their ability to transfer risk reduction knowledge and information to farmers.

Financial instruments to buffer disaster impacts in agriculture

Chile’s government has a range of financial instruments it can deploy to assist agricultural producers who incurred disaster-related damage and loss. MINAGRI and INDAP each have the authority to declare an agricultural emergency and allocate resources. Moreover, MINAGRI and CORFO have developed an agriculture insurance programme to transfer risks for agricultural producers through support provided by the state. Although these instruments are very responsive in nature, they do provide important safety nets and support to farmers’ recovery activities after a disaster has occurred. Existing emergency procedures, declaration processes and insights into Chile’s budget allocations are presented in the following sections.

Existing emergency procedures and emergency declaration process

At the ministerial level, MINAGRI’s Undersecretariat maintains a special budget line for “agricultural emergencies” through the symbolic allocation of USD 20 until an emergency is actually declared by ministerial decree. At that moment, funds are reallocated to address the crisis, thus there are no substantial ex ante resources (please see the next section: Budget allocations by MINAGRI and INDAP for agricultural emergency response). MINAGRI can declare an agricultural emergency on its own authority, without an emergency or disaster declaration from the President of the Republic. The Procedure for Declaring Agricultural Emergencies provides the technical grounds for a bottom-up (local to national level) decision-making process (MINAGRI, 2009). Each agricultural emergency declaration explicitly defines the type of emergency, municipalities affected, type of support provided to farmers and the anticipated duration of the state of emergency. This process involves ongoing communication and information flows between the key sectoral, national and regional DRM actors at both national and regional levels. It is initiated with a meeting of the Regional Agricultural Risk Management Commission by the SEREMIs and includes all Directors and agricultural representatives in the region, including INIA, to discuss the emergency. This is followed by the technical report prepared and issued by INIA, which is developed based on this meeting as well as informed by SEGRA’s damage report as shown in Figure 11.

An agricultural emergency can also be declared at the discretion of INDAP’s National Director, in the event of a disaster that directly and adversely affects INDAP’s current and potential users. Within this context, INDAP also has a special line of funding for
these situations. The **INDAP Emergency Procedures** provide guidelines to INDAP personnel regarding procedures for its users and/or potential users once an agricultural emergency has been declared (INDAP, n.d.). INDAP emergency declarations specify the geographic area affected, number of beneficiaries and the total amount of financial resources available to address farmers’ emergency needs.

**Figure 11. Agricultural emergency declaration process**

![Agricultural emergency declaration process diagram](source)

The following section provides an overview of resources allocated by MINAGRI and INDAP for agricultural emergencies. The agencies operate in parallel and in theory there can be a duplication of beneficiaries. The Undersecretariat of Agriculture’s resources can be allocated to all types of agricultural producers, while INDAP focuses primarily on their users and/or potential users, namely, smallholder farmers, yet the potential overlap is not monitored.

**Budget allocations by MINAGRI and INDAP for agricultural emergency response**

**Agricultural emergency funding via MINAGRI’s Undersecretariat**

The Undersecretariat of Agriculture sets aside a special budget line item for “Agricultural Emergencies” at the beginning of each fiscal year and allocates a nominal “symbolic” budget of approximately USD 20. Once an agricultural emergency has been declared, the Undersecretariat of Agriculture can increase this budget by transferring resources from its other budget lines. However, this resource reallocation may impact other actions and development programmes since they may no longer have access to the full amount of originally allocated funds. Thus, this budget line should not be considered as a straightforward
‘emergency fund’. It is not assigned as such in advance and it is not regulated through by-laws or other legal frameworks. In this way, the Undersecretariat is flexible in its approach to allocate funding when needed. However, this strategy is reactive and not based on risk analysis that would be part of proactive disaster risk management planning.

Table 6 shows the Undersecretariat of Agriculture’s emergency funds allocation during the 2010 to 2019 period.

Table 6. MINAGRI Undersecretariat emergency funds allocation, 2010–2019

<table>
<thead>
<tr>
<th>Fiscal year</th>
<th>Initial emergency allocation (USD)</th>
<th>Increased budget allocation for emergencies during the year (USD)</th>
<th>Total emergency allocation (USD)</th>
<th>Main hazard considered in the agricultural emergency declaration by MINAGRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>20</td>
<td>5 512 000</td>
<td>5 512 020</td>
<td>Earthquake</td>
</tr>
<tr>
<td>2011</td>
<td>20</td>
<td>0</td>
<td>20</td>
<td>Water deficit/drought</td>
</tr>
<tr>
<td>2012</td>
<td>20</td>
<td>31 000</td>
<td>31 020</td>
<td>Water deficit/drought</td>
</tr>
<tr>
<td>2013</td>
<td>20</td>
<td>4 343 000</td>
<td>4 343 020</td>
<td>Frost</td>
</tr>
<tr>
<td>2014</td>
<td>20</td>
<td>560 000</td>
<td>560 020</td>
<td>Water deficit/drought</td>
</tr>
<tr>
<td>2015</td>
<td>20</td>
<td>0</td>
<td>20</td>
<td>Water deficit/drought</td>
</tr>
<tr>
<td>2016</td>
<td>20</td>
<td>0</td>
<td>20</td>
<td>Water deficit/drought</td>
</tr>
<tr>
<td>2017</td>
<td>20</td>
<td>8 819 000</td>
<td>8 819 020</td>
<td>Forest fires</td>
</tr>
<tr>
<td>2018</td>
<td>20</td>
<td>0</td>
<td>20</td>
<td>Rain or snow out of the season</td>
</tr>
<tr>
<td>2019</td>
<td>10</td>
<td>686 000</td>
<td>686 020</td>
<td>Water deficit/drought</td>
</tr>
</tbody>
</table>


The 2017 forest fires resulted in the Undersecretariat’s largest allocation during this period, USD 8.8 million, followed by more than USD 5.5 million for the 2010 earthquake/tsunami, and USD 4.3 million for the 2013 frost. No funding was reallocated in 2011, 2015, 2016 or 2018.

**INDAP special emergency line of funding for agriculture and livestock**

For many years, INDAP conducted the same emergency funding approach as MINAGRI, that is, allocating a symbolic amount to agricultural emergencies and increasing it as needed. However, in 2016 this initial emergency allocation was significantly increased and between 2016–2019 the allocation reached, on average, USD 2.1 million, as shown in Table 7. However, due to the lack of a specific budget allocation strategy (based on risk analysis or past emergency expenditures) INDAP has been faced with a continuous transfer of financial resources from its development programmes to annually increase its initial emergency fund allocation.
Table 7. INDAP emergency resources and emergency bonos allocation, 2010–2019

<table>
<thead>
<tr>
<th>Fiscal year</th>
<th>Initial emergency allocation (USD)</th>
<th>Increased allocation for emergencies (USD)</th>
<th>Total INDAP emergency allocation (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>19.6</td>
<td>21 348 000</td>
<td>21 348 019.6</td>
</tr>
<tr>
<td>2011</td>
<td>20.7</td>
<td>7 080 000</td>
<td>7 080 020.7</td>
</tr>
<tr>
<td>2012</td>
<td>20.6</td>
<td>18 971 000</td>
<td>18 971 020.6</td>
</tr>
<tr>
<td>2013</td>
<td>20.2</td>
<td>15 636 000</td>
<td>15 636 020.2</td>
</tr>
<tr>
<td>2014</td>
<td>17.5</td>
<td>25 960 000</td>
<td>25 960 017.5</td>
</tr>
<tr>
<td>2015</td>
<td>15.3</td>
<td>31 048 000</td>
<td>31 048 015.3</td>
</tr>
<tr>
<td>2016</td>
<td>1 477 000.0</td>
<td>-</td>
<td>1 477 000.0</td>
</tr>
<tr>
<td>2017</td>
<td>2 311 000.0</td>
<td>19 671 000</td>
<td>21 983 000.0</td>
</tr>
<tr>
<td>2018</td>
<td>2 400 000.0</td>
<td>1 862 000</td>
<td>4 263 000.0</td>
</tr>
<tr>
<td>2019</td>
<td>2 254 000.0</td>
<td>11 946 000</td>
<td>14 200 000.0</td>
</tr>
</tbody>
</table>


Figure 12. INDAP’s emergency resources allocations (USD ’000) and number of emergency bonos delivered, 2010–2019


When smallholder farmers are faced with disaster-related damage and loss, INDAP provides financial aid (bonos) to support the continuity of their production activities. This may be in the form of either money¹⁹ (cash or check) or in-kind contribution (for example, fertilizer, seeds, animal feed, veterinary and/or agriculture consumables and services, irrigation infrastructure, supplementary pastures, infrastructure retrofitting). INDAP’s Regional Directors determine what

¹⁹ In each Exempt Resolution the amount is established for each beneficiary or group of beneficiaries. The amount should be assigned within the timeframe determined in the resolution.
kind of bonos to offer based on the regional context, type of hazard and extent of agricultural damage and loss (INDAP, n.d.).

To receive the bonos, smallholder farmers must be registered (already accredited) as INDAP users or potential users (that is, those who meet accreditation requirements) (National Directorate, INDAP and Ministry of Agriculture, 2014). Figure 12 shows the total INDAP emergency budget allocation per year and the number of emergency bonos actually delivered. The number of emergency bonos delivered does not correspond to the number of beneficiary farmers, because a farmer may receive more than one emergency bono in the same year, and some emergency bonos are allocated collectively to agricultural cooperatives. As a result, the available data do not show the annual number of individual farmers who receive these emergency bonos.

Table 8 and Table 9 present the percentages of INDAP’s 2016–2019 emergency budget and emergency bonos allocations by disaster type, based on disaggregated data. The greatest percentages of budget went to address: water deficit/drought (2016), forest fires (2017), various climatic events (2018), heavy rains and flooding (2019). The percentage of bonos allocated for each disaster was less than its budget share in every case except frost and the various climatic events, for which the percentage of bonos was higher than those emergency budget allocations.

Table 8. Percentage of INDAP’s emergency budget allocation by disaster type, 2016–2019

<table>
<thead>
<tr>
<th>Type of disaster</th>
<th>2016 (%)</th>
<th>2017 (%)</th>
<th>2018 (%)</th>
<th>2019 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frost</td>
<td>6.1</td>
<td>-</td>
<td>1.7</td>
<td>-</td>
</tr>
<tr>
<td>Water deficit/drought</td>
<td>51.8</td>
<td>-</td>
<td>20.1</td>
<td>82.1</td>
</tr>
<tr>
<td>Heavy rains and landslides</td>
<td>10.2</td>
<td>7.6</td>
<td>1.9</td>
<td>-</td>
</tr>
<tr>
<td>Heavy rains and floods</td>
<td>4.1</td>
<td>4.6</td>
<td>2.1</td>
<td>9.8</td>
</tr>
<tr>
<td>Various climatic events, e.g. hail, snow</td>
<td>21.5</td>
<td>4.9</td>
<td>46.9</td>
<td>1.3</td>
</tr>
<tr>
<td>Forest fires</td>
<td>6.3</td>
<td>77.4</td>
<td>-</td>
<td>6.6</td>
</tr>
<tr>
<td>Earthquake</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.2</td>
</tr>
<tr>
<td>Other kind of emergencies, e.g. landslides, collapse of irrigation channel, pink bug infestation</td>
<td>-</td>
<td>5.5</td>
<td>27.3</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: FAO’s compilation using INDAP’s emergency funding database.
Table 9. Percentage of INDAP’s emergency *bonos* allocation by disaster type, 2016–2019

<table>
<thead>
<tr>
<th>Type of disaster</th>
<th>2016 (%)</th>
<th>2017 (%)</th>
<th>2018 (%)</th>
<th>2019 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frost</td>
<td>10</td>
<td>-</td>
<td>25.8</td>
<td>-</td>
</tr>
<tr>
<td>Water deficit/Drought</td>
<td>44.8</td>
<td>-</td>
<td>9.5</td>
<td>92.2</td>
</tr>
<tr>
<td>Heavy rains and landslides</td>
<td>1.2</td>
<td>2.9</td>
<td>0.4</td>
<td>-</td>
</tr>
<tr>
<td>Heavy rains and floods</td>
<td>4.4</td>
<td>14.6</td>
<td>1</td>
<td>3.6</td>
</tr>
<tr>
<td>Various climatic events</td>
<td>34.8</td>
<td>28.9</td>
<td>60.6</td>
<td>1.9</td>
</tr>
<tr>
<td>Forest fires</td>
<td>4.8</td>
<td>45.2</td>
<td>-</td>
<td>2.2</td>
</tr>
<tr>
<td>Earthquake</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.1</td>
</tr>
<tr>
<td>Other kind of emergencies</td>
<td>-</td>
<td>8.4</td>
<td>2.7</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

*Source: FAO’s compilation using INDAP’s emergency funding database.*

However, as Figure 13 and Figure 14 illustrate, there is no clear correlation between the percentage of INDAP’s emergency budget and emergency *bono* allocations by disaster type during this period. For example, the budget allocation for forest fires was 62.8 percent, while the emergency *bono* issued for this disaster type reached only 31.9 percent. This is due to the fact that emergency response interventions may not target farmers directly. Assistance may differ depending on disaster type, and vary from the simple provision of animal feed to complex infrastructure rehabilitation and recovery of agricultural production and livelihoods activities.

**Figure 13. INDAP’s share of emergency budget allocation by disaster type, 2016–2019**

*Source: FAO’s compilation using INDAP’s emergency funding database.*
Furthermore, INDAP also has the authority to employ other agriculture development instruments and projects, such as SAG’s biosecurity campaigns, rehabilitation of irrigation systems and promotion of sustainable soil management, to support affected farmers when an agricultural emergency has been declared.

Agricultural Insurance Programme

Agroinsurance is a pillar of Chile’s agriculture DRM strategy. CORFO’s agricultural insurance committee – Agroseguros\(^{20}\) – was established in 2000 to increase awareness of agricultural insurance and establish market conditions (for example, subsidies) to make it more viable for different types of crops, livestock and forestry activities. In this way, Agroseguros has increased the number of insurance products purchased each year and has its own annual budget to provide subsidies to agricultural producers.

Unlike INDAP’s special budget line of emergency funding described earlier, which targets smallholders that receive INDAP assistance, every type of producer in the crop, livestock and forestry subsectors (large-, medium-, small-sized companies, microenterprises and small producers) is eligible for the agricultural insurance state subsidy. The agricultural insurance products for which these state subsidies are available include:\(^{21}\)

- **crop products:** for annual crops (grains, vegetables, legumes), fruit trees and flowers;
- **livestock products:** for cattle and sheep;
- **apiculture products:** for honey production, nucs and hives; and
- **forestry products:** for forests and forestry plantations.

\(^{20}\) For more information on Agroseguros, see www.agroseguros.gob.cl/.

\(^{21}\) Information on the various agricultural products for crops, livestock, apiculture, and forestry can be accessed via www.agroseguros.gob.cl/folleteria/.
The type of natural hazards covered by Agroseguros’ subsidies are detailed in Table 10.

Table 10. Natural hazards for which subsidized agricultural insurance products are available

<table>
<thead>
<tr>
<th>Type of insurance</th>
<th>Agriculture products</th>
<th>Livestock products</th>
<th>Apiculture products</th>
<th>Forestry products</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Flowers</td>
<td>Fruit trees (performance)</td>
<td>Annual crops</td>
<td>Bovine livestock</td>
</tr>
<tr>
<td>Snow</td>
<td>n/a</td>
<td>Apple and pear Grape (additional)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Frost</td>
<td>X</td>
<td>Apple and pear Olive and kiwi Grape Walnut Blueberries Raspberry</td>
<td>X</td>
<td>n/a</td>
</tr>
<tr>
<td>Hail</td>
<td>X</td>
<td>Apple and pear Grape Blueberries Raspberry</td>
<td>X</td>
<td>n/a</td>
</tr>
<tr>
<td>Lightning</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>X</td>
</tr>
<tr>
<td>High winds</td>
<td>X</td>
<td>Apple and pear Grape (additional)</td>
<td>X</td>
<td>n/a</td>
</tr>
<tr>
<td>High rainfall</td>
<td>n/a</td>
<td>Apple and pear Grape (additional) Walnut (additional)</td>
<td>X</td>
<td>n/a</td>
</tr>
<tr>
<td>Floods</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>X</td>
</tr>
<tr>
<td>River flood</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Drought</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Heatstroke</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Landslides</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Volcanic eruption</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>X</td>
</tr>
<tr>
<td>Earthquake</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>X</td>
</tr>
<tr>
<td>Tsunami</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Forest fire</td>
<td>X</td>
<td>Additional (for all fruit trees)</td>
<td>n/a</td>
<td>X</td>
</tr>
</tbody>
</table>

n/a: not applicable
X: Natural hazard considered in the basic insurance premium
Additional: Natural hazard could be considered in additional insurance premiums

Source: FAO’s compilation from information available from Agroseguros, 2020.

---

22 Annual crops include cereals, vegetables, industrial crops, legumes and forage.
Most of the insurance products purchased are for garden vegetables and grains, followed by industrial crops, and then fruit and livestock, although insurance coverage of the latter two has increased substantially over the last few years. Although all of the insurance types in Table 10 cover Chile’s main natural hazards, some apply special deductibles for certain event types, while others mandate farmers to purchase additional coverage for particular hazards.

There are two ways in which farmers can obtain subsidized agricultural insurance; either by purchasing coverage directly from insurance companies that are members of Agroseguros, such as HDI Seguros, MAPFRE, Sura and Renta Nacional, or by working through consolidators that are pre-qualified by Agroseguros. These include government agencies (INDAP, INFOR), banks, agriculture cooperatives and companies in the crop and livestock subsectors. Box 4 provides more information about the state subsidy for crop and livestock insurance.

Box 4. State subsidy for crop and livestock insurance

| The government subsidy for crop and livestock insurance consists of a base subsidy of 40 percent + 1 UF\(^{23}\) of the cost of the insurance premium. The base can be increased for: a policy renewal (+10 percent), group policy (+10 percent), grain insurance (+5 percent), and for remote areas (+5 percent). This brings the total potential subsidy to 70 percent + 1 UF per policy. The total subsidy cannot exceed 80 UF (USD 2 880) per policy and 120 UF (USD 4 320) per type of crop and livestock for the beneficiary farmer.

In addition, INDAP’s Agricultural Insurance Support Programme (PACSA) is available to assist smallholder and subsistence farmers in purchasing an agriculture insurance policy. PACSA will complement the Agroseguros subsidy up to 95 percent of the net premium cost unsubsidized by Agroseguros. The maximum net co-payment farmers may receive is 5 percent for annual crops, 10 percent for fruit trees, 5 percent for bovines, 5 percent for sheep and 5 percent for apiculture.


When a disaster has occurred, farmers file a claim directly with the insurance company, consolidator or broker. If needed, INDAP provides technical assistance to help smallholder farmers through this process. Agroseguros works with all parties involved to manage the government subsidy programme to be certain that premium co-payments are made on a timely basis. Resources for the subsidies and Agroseguros’ operating expenses come out of the budget for MINAGRI’s Undersecretariat; funding is transferred to CORFO/Agroseguros on an annual basis.

\(^{23}\) The unidad de fomento or UF is a Chilean currency unit indexed to inflation. For reference, the value of the UF on 10 February 2020 was UF 28 352.33 (approximately USD 36).
via a funds transfer agreement. All subsidies are regulated and supervised by the

As shown in Table 11 and Table 12, MINAGRI allocated nearly USD 8.9 million to
Agroseguros in 2019 to subsidize 19 503 policies. Each policy may contain more
than one insurance product to cover different types of crops or livestock. That
same year, INDAP allocated USD 1.3 million for its Agricultural Insurance Support
Programme (PACSA), co-funding an annual average of 11 000 policies, which
includes over half of all INDAP policies (DIPRES, 2019). Combined, MINAGRI and
INDAP allocated a total of roughly USD 10.2 million to subsidize agricultural
insurance in 2019 (Figure 15).

Among the individual beneficiaries included: microenterprises (56 percent), small
businesses (31 percent), medium-sized enterprises (8 percent) and large
companies (5 percent) (Vega, 2020). This shows that while all types of agricultural
producers may participate in the programme, smaller and less-resilient farmers
benefit the most. However, the exact number of beneficiaries are currently
unknown, because only the total number of policies that are subsidized are
documented and one single beneficiary can have several policies.

It is worth noting that Agroseguros has begun developing parametric insurance
products in the Araucanía region. This may help to reduce the amount of funds
transferred from development programmes to agricultural emergency response
and recovery needs. To implement this initiative, DIPRES has added a line to
regional governments’ budgets stating that:

Regional governments may transfer resources to the Ministry of Agriculture to
contract parametric insurance products for the agriculture sector to manage risks
associated with catastrophic events: drought, frosts, heavy snowfall/blizzards, and
excessive rainfall (Vega, 2020).

Some parametric insurance products may be finalized in the next few years.
This is because pillar 3 of the current government subsidy programme specifies
“boosting competitiveness of agricultural small and medium enterprises (SMEs)”
by “emphasizing the use of agriculture insurances for annual crops, fruit crops,
livestock, apiculture and forestry, in addition to price insurances”
(Piñera Echenique, 2018).
Table 11. MINAGRI Undersecretariat and INDAP budget allocations to subsidize crop and livestock insurance (USD), 2010–2019

<table>
<thead>
<tr>
<th>Year</th>
<th>MINAGRI Undersecretariat allocations for Agroseguros</th>
<th>INDAP allocations to PACSA</th>
<th>Total allocation to subsidize agricultural insurance (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial allocation for agricultural insurance subsidy (Agroseguros) (USD)</td>
<td>Increased/decreased allocation for agricultural insurance subsidy (Agroseguros) (USD)</td>
<td>Total allocation for agricultural insurance subsidy (Agroseguros) (USD)</td>
</tr>
<tr>
<td>2010</td>
<td>8 435 000</td>
<td>-66 780</td>
<td>8 369 090</td>
</tr>
<tr>
<td>2011</td>
<td>10 952 000</td>
<td>-2 298 380</td>
<td>8 654 310</td>
</tr>
<tr>
<td>2012</td>
<td>9 395 000</td>
<td>-2 476 090</td>
<td>6 919 680</td>
</tr>
<tr>
<td>2013</td>
<td>7 379 000</td>
<td>1 457 420</td>
<td>8 837 310</td>
</tr>
<tr>
<td>2014</td>
<td>6 549 000</td>
<td>1 051 950</td>
<td>7 601 600</td>
</tr>
<tr>
<td>2015</td>
<td>6 655 000</td>
<td>0</td>
<td>6 655 620</td>
</tr>
<tr>
<td>2016</td>
<td>8 197 000</td>
<td>-1 018 110</td>
<td>7 179 100</td>
</tr>
<tr>
<td>2017</td>
<td>9 268 000</td>
<td>-584 960</td>
<td>8 683 210</td>
</tr>
<tr>
<td>2018</td>
<td>9 503 000</td>
<td>0</td>
<td>9 503 770</td>
</tr>
<tr>
<td>2019</td>
<td>8 858 000</td>
<td>0</td>
<td>8 858 760</td>
</tr>
</tbody>
</table>

Table 12. Total MINAGRI Undersecretariat and INDAP allocations to subsidize agricultural and livestock insurance (USD), number of policies contracted per year

<table>
<thead>
<tr>
<th>Year</th>
<th>Total public budget allocation to subsidize agricultural and livestock insurance (USD)</th>
<th>Number of policies</th>
<th>Average insured amount per insurance policy (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>8 369 000</td>
<td>18 915</td>
<td>15 400</td>
</tr>
<tr>
<td>2011</td>
<td>8 654 000</td>
<td>20 618</td>
<td>13 300</td>
</tr>
<tr>
<td>2012</td>
<td>8 153 000</td>
<td>19 708</td>
<td>13 500</td>
</tr>
<tr>
<td>2013</td>
<td>10 084 000</td>
<td>19 938</td>
<td>15 400</td>
</tr>
<tr>
<td>2014</td>
<td>8 708 000</td>
<td>19 180</td>
<td>14 400</td>
</tr>
<tr>
<td>2015</td>
<td>7 649 000</td>
<td>18 207</td>
<td>14 700</td>
</tr>
<tr>
<td>2016</td>
<td>9 291 000</td>
<td>17 082</td>
<td>2 000</td>
</tr>
<tr>
<td>2017</td>
<td>10 653 000</td>
<td>16 794</td>
<td>27 800</td>
</tr>
<tr>
<td>2018</td>
<td>10 932 000</td>
<td>16 613</td>
<td>29 400</td>
</tr>
<tr>
<td>2019</td>
<td>10 193 000</td>
<td>19 503</td>
<td>29 400</td>
</tr>
</tbody>
</table>

Source: FAO’s compilation using data from Chile’s Budget Directorate, available from DIPRES, 2020 and from the Agricultural Insurance Information System (SISA).

Figure 15. MINAGRI-INDAP combined allocation to subsidize agricultural insurance (USD ‘000), and the number of policies contracted per year

Source: FAO’s compilation using data from Chile’s Budget Directorate, available from DIPRES, 2020, and from the Agricultural Insurance Information System (SISA).
Conclusions and recommendations

The crop, livestock and forestry subsectors in Chile are particularly vulnerable to the adverse impacts of natural hazards, such as drought, earthquakes, frosts, floods and forest fires. Chile’s shift away from reactive emergency response to proactive disaster risk management is reflected in its legislation and policy framework, and the mandates of several institutions. To some extent, agriculture is being mainstreamed into national disaster risk management policies, strategies and plans. In addition, within the SNPC, Chile has an active, multi-sectoral, multi-stakeholder, national DRR platform through which the agriculture sector can put forward its needs and priorities. In addition to those achievements, the following areas of strength can be highlighted:

Disaster risk management roles and responsibilities are clearly delineated

Within the Ministry of Agriculture, SEGRA has responsibility for the coordination of disaster risk reduction and management actions implemented by its agro services. ODEPA, CIREN, INIA, FIA, INDAP and Agroseguros are all part of the Ministerial Technical Advisory Committee for Agricultural Emergencies and Agricultural Risk Management, and their responsibilities – within a specific DRM area – are outlined in their mandates. Among these agencies, INDAP and Agroseguros are the most developed in DRM, while SEGRA and INIA have developed concrete agroclimatic risk monitoring and early warning tools. MINAGRI counts on input from these agencies when preparing agricultural emergency declarations and implementing agricultural emergency response and recovery actions.

Broad range of agroclimatic information platforms and products

SEGRA/MINAGRI, INIA and other members of RAN are providing a wide range of agroclimatic information platforms and products. Web portals such as Agromet provide agricultural stakeholders with free access to real-time information on potential natural hazards that may affect agricultural activities by region. On the other hand, the Agroclimatic Risk Observatory Platform acts as a drought early warning and monitoring system, something critical given the large number of emergency declarations and emergency expenditure linked to drought. In addition, agricultural producers can access an array of agroclimatic information bulletins. Together they represent a significant effort to provide agrometeorological information and, to some extent, to reduce the adverse impacts of natural hazards on agricultural production through specific agricultural practices. However, it is not clear to what extent these agroclimatic information platforms and information products are accessed and used by small-scale family farmers, who are not necessarily regular internet users.
Training and outreach activities targeting both institutional actors and producers

Over the past few years, SEGRA/MINAGRI have organized multiple initiatives to strengthen capacities in disaster risk management, including training sessions, workshops, and seasonal outlook events. These have targeted different agricultural stakeholders, including staff and policy makers from SEGRA and other agro services entities, as well as stakeholders from academic institutions. Both SEGRA/MINAGRI and INDAP have begun targeting agricultural producers and extensionists directly to help them use and apply the various agroclimatic information products in their decision-making, for which there is an increasing demand.

Data useful for disaster risk management is collected

SEGRA/MINAGRI, Agroseguros and INDAP each manage their own databases to track the number of agricultural emergencies by hazard type and municipality, and monitor MINAGRI and INDAP budget allocations for agricultural emergency response and recovery activities. These provide the evidence needed to inform the decision-making, planning and implementation of DRM programmes. Key data points include: i) the number of producers acquiring agricultural insurance products; ii) the link between the number of insured producers and the number of issued emergency bonos; iii) the link between producers that receive emergency bonos within the context of implementing specific crop, livestock and forestry programmes; iv) the types (cash or in-kind) and number of emergency bonos issued to producers by hazard type; and, v) the identification of producers that receive the most emergency bonos to help plan further actions that could reduce their risks. If the existing SEGRA, INDAP and Agroseguros databases were to be integrated, valuable analysis could be drawn from this information.

Established risk transfer mechanisms and emergency response resources

A variety of financial instruments are available to fund emergency response and recovery activities in the agriculture sector and to transfer risk through the provision of state subsidies for agricultural insurance. Both MINAGRI and INDAP have budget lines for emergency response. MINAGRI begins each year by allocating a “symbolic” amount of USD 20, then reallocates additional resources to this purpose from other developing programmes as needed. INDAP previously adopted the same approach, but since 2016 it has allocated an annual average of over USD 2.1 million at the start of the year. INDAP can issue emergency bonos to support smallholder farmers. Agroseguros as well as INDAP provide subsidies for agricultural insurance. The former targets all types of producers, while the latter supports smallholder farmers.
Recommendations

Despite the extensive progress that has been achieved over the years regarding disaster risk management in Chile’s agriculture sector, certain challenges still exist, including: its legislation and policy disaster risk management framework; institutional capacities of the sectoral actors, including MINAGRI’s various public and public-private entities; the need for increased financial resources; and ensuring that disaster risk management is included as a cross-sectoral approach across MINAGRI’s programmes. The following summarizes some of the needs and recommendations presented in this chapter.

**Enhance involvement of agro services in disaster risk management**

Agro services could play a larger role in advising MINAGRI on how to best apply interventions to prevent and mitigate the impact of natural hazards. In this regard, disaster risk management roles and responsibilities should be better defined and further enhanced with an eye toward greater coordination among the services. To successfully carry out its responsibilities as technical secretary of the Ministerial Technical Advisory Committee for Agricultural Emergencies and Risk Management, SEGRA/MINAGRI must be assigned the human, technical and financial resources it needs to continue strengthening the capacities of Chile’s various agro services and provide the technical support they need to apply explicit DRR criteria in their analysis, planning and programme implementation. The role of SEGRA/MINAGRI remains fundamental to ensure multi-sectoral and multi-stakeholder coordination and collaboration at all levels to build the sector’s resilience to natural hazard-induced disasters.

**Increase the dissemination and use of agroclimatic information platforms and products**

Chile should increase the number and type of users of existing agroclimatic platforms and products, making special provisions to ensure information is provided in simple and accessible formats to small-scale farmers. As the climate is changing, this scientific information may become more important and crucial to help farmers reduce the adverse impacts of climate related hazards on their production. Options to enhance the outreach of existing products include: i) automatic subscriptions to information products on RAN member websites (INIA has already implemented this for its agroclimatic bulletins); ii) establish mutual links on the websites and products of the RAN members; iii) turn Agromet’s web portal into a gateway to access the agroclimatic information products available within the RAN framework; iv) increase awareness of these agroclimatic platforms and the capacity to use them among potential users; v) build user feedback mechanisms into the platforms so that they can be continually upgraded; vi) develop and distribute simple complementary offline products; vii) use WhatsApp and SMS to expand outreach in areas with less connectivity and internet usage; viii) advocate for increased digital infrastructure in rural agricultural areas to
improve access to internet and online services. ix) track and integrate new information products and tools developed by other stakeholders such as the Ministry of Environment that could support agriculture disaster and climate risk management.

**Train agricultural producers and extensionists on agriculture disaster risk management**

Chile could effectively promote resilient agriculture practices through its well-established extension services. This could be achieved by providing regular disaster risk management training for agriculture extensionists. Currently, training sessions target mostly government staff, whilst extensionists are external consultants. It is highly important that their capacities related to DRM are strengthened as it is the extensionists who raise awareness of good practices and technologies and transfer the knowledge to farmers. The farmers then implement this knowledge to reduce the adverse impacts of natural hazards on agriculture.

**Improve access and analysis of existing data to inform disaster risk management strategies**

Available data could be used to generate more detailed analyses if it was systematized differently. Among others, it should be used to build a better understanding of the type of events farmers are regularly affected by and what assistance they are receiving (including subsidized insurance). This would require a significant improvement in information sharing across institutions, currently most information produced can only be accessed by the institution that manages the information. Even though some of the information should be kept confidential, such as data about individual producers, other information could help build a digital repository where data is integrated and publicly accessible to various agricultural stakeholders. This would significantly enhance decision-making about agriculture programmes and policies, and inform a financial strategy for disaster risk management in agriculture. As the sectoral lead on DRM, SEGRA/MINAGRI is well positioned to manage the integration of databases and improve the level of analysis. Moreover, the role of academia and the private sector is highly important in terms of data collection, analysis and sharing and the Ministry should foster increased collaboration with these actors.

**Develop a financial strategy for disaster risk management in the agriculture sector**

Various financial instruments are available to support agriculture emergency response and recovery, and to transfer farmers’ risks via insurance. These include allocating funds for emergency support, issuing emergency bonos, and subsidizing agricultural insurance. However, it is not clear to what extent there is complementarity between the different budget resources provided by MINAGRI, INDAP and Agroseguros. For example, at present one of the main challenges is related to adequately determine the annual emergency resources annually.
allocated by the Secretary of Agriculture and INDAP. A financial disaster risk management strategy for the crop, livestock and forestry subsectors could determine the allocation of funds and consider the complementarity and advantages of the different options. In order to do so, Chile must assess the extent to which emergency bonos and agricultural insurance subsidy programmes cover disaster-related risks, especially for vulnerable farmers, and the degree to which these benefits build resilience, so that the financial strategy is sustainable over time. Such a strategy would help to define, prioritise and allocate financial resources to support disaster prevention, mitigation and preparedness for response actions, including, for example, risk and vulnerability assessments, which aim to reduce the adverse impacts of disasters on the agriculture sector.
References


**Centro Latinoamericano para el Desarrollo Rural (RIMISP).** 2020. *RIMISP* [online]. Santiago. [Cited 10 May 2020]. https://www.rimisp.org/

**Cruz, B. T.** 2020. *Situación de la industria láctea: producción, precios y comercio exterior.* Santiago, ODEPA. (also available at https://bibliotecadigital.odepa.gob.cl/bitstream/handle/20.500.12650/70169/ArticuloLeche20200609.pdf)

**Direccion Meteorológica de Chile.** 2019. *Informe final - Convenio de transferencia de recursos y de colaboración entre el Instituto de Desarrollo Agropecuario y la Dirección General de Aeronáutica Civil – dirección meteorológica de chile 2018-2019*


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