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|  | Annual report |
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| approved by |   |

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| **Attachments**Attachment 1. Celia M. Reyes, Sonny N. Domingo, Adrian D. Agbon and Ma Divina C. Olaguera (PIDS). Climate-Sensitive Decisions and the Use of Climate Information: Insights from selected Agricultural Producers in La Trinidad and Atok, Benguet.Attachment 2. Summary of UPLB team accomplishments: July 2017 to June 2018 Attachment 3. PAGASA survey of agriculturists in Ormoc, LeyteAttachment 4. PIDS report on DRR and CCA policy updatesAttachment 5. Peter T Hayman. Discussion paper and draft example of communication material. Attachment 6. Parton, K.A. and Buyani, T. CSU Background to Weather Index Insurance for Rice and Corn Producers in the Philippines. |

# Progress summary

Disaster Risk Reduction and Climate Change Adaptation continue to be highly relevant to Philippine agriculture. The challenge for this project has always been to work out how to make a meaningful contribution to the large and changing RD&E from the national and international effort on DRR and CCA.

The identified niche or role for this project is to use applied socio-economics to:

* understand the decision making context of climatically sensitive decisions,
* establish the potential value of information,
* observe barriers to the use of information, and
* research ways to improve communication and use.

The Philippine team have been active in the three case study regions of Benguet, Mindoro and Leyte. In all regions focus groups and one-to-one surveys with trained enumerators have been held with farmers and extension workers. The design of the focus groups and surveys have been coordinated between the Philippine partners and provide a rich resource on climate risks identified by farmers along with the information and techniques they use to manage these risks. The information collected spans a range of timeframes from response to tropical cyclone warnings, weather forecasts, seasonal outlooks and climate change projections. There is also information on farm level, value chains and LGU policy decisions.

In the previous annual report we identified the three case study regions and corresponding farming systems as 1) vegetable and flower production in Benguet, central Luzon 2) rice and corn farming in Mindoro south of Luzon and 3) rice, corn and vegetable farming in Leyte in the central Visayas.

The second year of this project has involved detailed case studies on a variety of decisions in these case study regions. These include the following climate sensitive decisions;

Benguet case study

* selection of vegetable crops and varieties (Potatoes, Cabbage, Carrots);
* the use of plastic tunnels as temporary cover to exclude heavy rain on cabbages in Benguet
* the use of permanent structures for flower production
* response of small holders to warning of heavy rainfall/tropical cyclones

Mindoro case study

* Fertiliser rates for corn
* Methods of drying corn post-harvest
* Choice of rice variety (hybrid vs traditional)
* Fertiliser rates for rice

Leyte case study

* Variety choice for corn (hybrid vs open pollinated)
* Using a rainfall forecast to proceed or delay plowing (heavy rain will require the field to be re-plowed)

These 10 decisions exceed the 6 decisions that are due at this point of the project. We recognise that we will need to place a greater emphasis on decisions beyond the farm gate.

The aim of the project is to improve the information flows between PAGASA and key decision makers involved in managing climate and weather risk of small holder farmers. The case studies are means to this end rather than an end in themselves. Resources and experiences from this project have contributed to the design of a process titled Rapid Climate Decision Analysis (RCDA) which aims to speed up the process of eliciting the local knowledge of a farmer or adviser so that more time can be allocated to interpretation. This framework has been applied in a project with grain advisers in southern Australia and will be trialled with wine grape growers.

Crop insurance and weather based insurance is an increasingly important way that climate risk is managed in the Philippines. Legislation is likely to be approved in the near future that would lead to a substantial increase in the Philippine Crop Insurance Program from 7.5M AUD to 125 M AU. Insurance is an important user of information from PAGASA and where insurance is prevalent it is likely that there will be less incentive for farmers or LGUs to use forecast information. PAGASA and PIDS are involved in advising policy settings for crop insurance and Professor Kevin Parton and colleagues from Charles Sturt University have been researching the role of crop insurance in the Philippines and other developing countries.

In addition to regular field trips to Benguet, Mindoro and Leyte the project had a successful ‘kick-off’ event at Calapan city Mindoro on 17th October 2017 with representatives from ACIAR Manila and all project partners. At all these regions there has been an opportunity for PAGASA to present climate updates and receive feedback on their services.

When developing the project we were encouraged to work within the modality of identifying the key mandated national agencies (PAGASA and the Department of Agriculture) and then to work with them to support LGUs and other actors in the delivery of DRR. We have been pleased to find receptive responses from LGUs in all case study regions. We have developed good engagement with regional universities (Benguet State University, Mindoro State College of Agriculture and Visayas State University).

# Achievements against project activities and outputs/milestones

#### Objective 1: To understand current status of DRR and CCA for small holder farming in case study regions by reviewing literature, programs and projects. (10% of resources)

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| No. | Activity | Outputs/milestones | Completion date | Comments |
| 1.1 | Identify case study farming groups and LGUs | Report identifying the selection of case studies including criteria for selection. | Dec 2016 | **Addressed in 2017 annual report.**We have chosen three case study regions; High value horticulture in Benguet in central Luzon, corn and rice in Mindoro and corn, rice and vegetables in Leyte. The criteria for selection are outlined in Attachment 1.1(a) and a report by PAGASA 1.1(b) provides detail on the three case study locations. The switch from Albay to Mindoro was initiated by the need to improve links with SARAI as requested by PCAARRD but as discussed in Section 8 (Problems and Opportunities) there are other advantages of Mindoro.Attachment 1.1(c) provides an outline of farming systems in Benguet prepared by PIDS.  |
| 1.2 | Work with Bureau of Agriculture to compile past and current RD&E material, programs and projects. | Annotated bibliography of past and current RD&E on climate and weather impacts on Philippine Agriculture with special emphasis on case study farming systems. This will include a review of agroclimatic indices used in literature. Journal publication. | June 2017 | **Addressed in 2017 annual report.**We are fortunate that the Philippine partners are very well connected into current and recently completed activities on climate risk management in the Philippines. Understandably, almost all activities from NGOs and government donors have some involvement with PAGASA and these are covered in Attachment 1.2(a).Climate change adaptation and disaster risk reduction are driven by well- coordinated national policy settings which are reviewed by PIDS in Attachment 1.2(b) and the DOST funded project SERAI is described in 1.2(c). Attachment 1.2(d) is a review of the literature (published and unpublished) along with current and recently completed projects using the lens of applied economics, and Attachment 1.2(e) covers the agroclimatic indices. |
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#### Objective 2: To analyse the potential and realised value of weather and climate forecasts for at least nine decision contexts (75% of resources)

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| No. | Activity | Outputs/milestones | Completion date | Comments |
| 2.1 | Survey how information is currently being used by decision makers and identify barriers (awareness of forecast, skill/accuracy of forecast, communication and timing of forecast, choices and resources). | Report on the current use of information and sources of information and a ranking of enabling factors and barriers to the effective use of information | June 2017 | At the project team meeting in March 2017 we agreed 1) to initially focus on services that are currently available from PAGASA and 2) for all Philippine partners to go together to Benguet and use this field trip as an opportunity to standardise approaches to investigating climate information and decision making. Attachment 2.1(a) is the report from this trip prepared by PIDS. In June 2017 the UPLB team visited Mindoro and Attachment 2.1(b) reports on this trip. The third case study will be developed during fieldwork in Leyte in August 2017. These reports provide a sound foundation for the project. They include detailed focus group discussion on: 1) perceived changes to climate, 2) impacts of climate and weather on agricultural production, 3) decisions that are made to manage risks and adapt to changes, and 4) sources of information on weather and climate including barriers to the use of this information in decision making.  |
| 2.2 | Identify at least one climate sensitive decision in each of the three case study regions. These will be selected from one of the three levels (farm, LGU and value chain). We will assess risks and use decision analysis in an economics framework to determine the potential value of the climate information. | Report providing decision context, decision trees and Excel spreadsheet with solved decision. Journal publication. | Dec 2017 | **From 2017 annual report.**Attachments 2.1(a) Benguet and 2.1(b) Mindoro provide a preliminary source of information on decisions. 1) at the farm level within the crop growing period (eg crop type, planting time, fertiliser and pesticides applications); 2) at the farm level post-harvest (drying, etc.) and pre-sowing (access to seeds and chemicals); and3) further along the supply chain by interviewing middlemen (most of whom are women) transport businesses and grain handlers.All groups were asked questions on the willingness to pay for various types of weather and climate information. Typically low values were reported, which is perhaps understandable given that many respondents regarded such information as being freely available, while some respondents were unaware of some of the forecast services.The focus groups provided valuable background on other climate stressors such as labour shortages and the agricultural production cost:price squeezes. **Update for 2018 annual report**In the reporting period July 2017 to June 2018, PIDS has conducted a detailed analysis of variety and crop choice for vegetable growers in Benguet (Attachment 1). UPLB has analysed basal fertiliser application and corn drying in Oriental Mindoro (Attachment 2). An exhaustive range of climate sensitive decisions for rice corn and vegetable production in Leyte and background biophysical and economic information is also contained in Attachment 2 for Leyte.  |
| 2.3 | Determine the solution that has the highest economic returns and observe the opportunities and barriers to the use of climate information in actual decision making. | Report of the observations & reflections that show the limits to application of climate information.Refined decision tree. Journal publication. | Dec 2018 |  |
| **Note:** Activities 2.4 and 2.5 will address further decisions and assessment of climate risk in an economic analysis in each of the three case study regions with analysis (2.4) and observation of how the analysis fits reality (2.5). At each case study region, the decision will be at different levels (farm, LGU or value chain) than Activities 2.2 and 2.3. Activity 2.6 and 2.7 will take further case studies leading to a total of nine case studies.  |
| 2.4 | Identify and analyse decision 2 at each site | Report providing decision context, decision trees and Excel spreadsheet with solved decision. | June 2018 | At this point in the project we have studied 10 different decisions. The second climate sensitive decision for the three case studies are as follows: Flower production at Benguet (included in Attachment 1)Rice production at Mindoro (included in Attachment 2) and Vegetable production at Leyte (Attachment 2). An extensive list of climate sensitive decisions is included in the PAGASA survey of agriculturists at Ormoc city, Leyte (Attachment 3) |
| 2.5 | Observe and reflect on decision 2 analysis | Report of the observations & reflections that show the limits to application of climate information.Refined decision tree. | June 2019 |  |
| 2.6 | Identify and analyse decision 3 at each site | Report providing decision context, decision trees and Excel spreadsheet with solved decision. | Dec 2018 |  |
| 2.7 | Observe and reflect on decision 3 analysis | Report of the observations & reflections that show the limits to application of climate information.Refined decision tree. | Dec 2019 |  |

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#### Objective 3: To develop pilot communication material and scale-up the project findings to other LGUs and CBOs.

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| No. | Activity | Outputs/milestones | Completion date | Comments |
| 3.1 | Prepare early draft material (print and Web-based) on use of climate information in Philippine agricultural decision making | First draft guidance material (print and password protected on Web) that outlines possible use of climate information in Philippine agricultural decision making.  | Due Dec 2017Will seek to revise the completion date | Attachment 5 contains some background discussion and draft concepts. We are less advanced in this activity than we had planned. This is in part due to the delay in starting the project and time spent engaging regional universities but mainly because we relied on the Agricultural Training Institute ATI to lead this component. As discussed in Section 8 of this report (Problems and Opportunities) the role of the ATI has been limited. We are confident that we will be able to produce focussed material that will complement the significant array of information from PAGASA and SARAI.Crop insurance is an increasingly important way that PAGASA information is used for risk management in Philippine Agriculture. Attachment 6 is a discussion of insurance for corn and rice growers by Charles Sturt University researchers Dr Buyani Thomy and Professor Kevin Parton.  |
| 3.2 | Work towards innovative solutions to the use of climate information in case study decision making | Report on solutions to specific barriers identified in the 6 decisions studied in Objective 2. | Dec 2018Will seek to revise the completion date |  |
| 3.3 | Partner with regional Universities to develop training material that can be used past the life of the project in graduate diploma courses, on-line training and workshops. Collate peer reviewed publications from the project. | Training module tested and made live online.Peer review papers collated. | June 2019Will seek to revise the completion date |  |

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# Impacts

## Scientific impacts

The scientific impacts during the reporting process come from 1) understanding of the decision context for a wide range of on-farm decisions (Attachments 1 and 2), 2) the early stages of the development of Rapid Climate Decision Analysis (RCDA) and 3) a thorough review of crop insurance. The substantial amount of material on decision analysis is contained in attachments for Benguet from PIDS (Attachment 1), Mindoro and Leyte from UPLB (Attachment 2) and Ormoc, Leyte from PAGASA (Attachment 3).

Before addressing progress in these three areas, it is useful to clarify the study area of the project. Figure 3.1 has been useful at project meetings to remind the project team and stakeholders where the project is focussed and what is context for the project.



**Figure 3.1 Schematic of study area for this project**.

Key messages from Figure 3.1

We are seeking action ready knowledge from climate science but this project is not a climate science project. Although there is a vast area of climate science relevant to DRR and CCA in the Philippines, this project does not set out to improve the climate science capacity of PAGASA. We aim to understand the climate science basis of climate data, extreme weather warnings, weather forecasts, seasonal climate forecasts and climate change projections that are available from PAGASA. More importantly we aim to understand how this information can be best applied to decision makers in the agricultural sector and the appropriate confidence that can be attached to this information. As outlined later in this report, we are discussing ways to include probabilities in the forecast information.

Agricultural systems provide important context but are not the focus of this project. We are not looking to develop agronomic recommendations or re-design farming systems in the Philippines. The detailed work on the case studies shows that we are seeking to develop tools to understand the nature of climate risk and weather risk in farming systems and see where and how information from PAGASA has value.

Following the concept of ‘focussing on the arrows rather than the boxes[[1]](#endnote-1)” our study area is the interface between climate science and agriculture. We recognise that without this project there is a flow of information between climate science and agriculture (double headed arrow) but that there is also a mismatch between the information from climate science and the perceived needs from agriculture.

The project team have collated a substantial amount of survey data from a range of agricultural decision makers in the case study regions. Much of this is in the process of being analysed, preliminary results indicate some interesting differences between gender and farming activities (and interaction between gender and farming activity). The range of case studies (Attachments 1 and 2) represent an advancement in the understanding of climate sensitive decisions for Philippine agriculture. As indicated in the 2017 annual report, our review of literature found many studies of climate impacts but relatively few studies of climate sensitive decisions and even fewer studies that looked at the economics of different management options.

*Notes on Weather Index Crop Insurance for Rice and Corn in the Philippines*

Crop insurance has existed for many years in the Philippines primarily under the auspices of the government Philippine Crop Insurance Corporation (PCIC). For rice and corn this has been an indemnity insurance with premiums shared between the farmer, credit institutions and the government. Hence, there are various ways to regard this insurance. First, it is subsidised by government. Second, it encourages farmers to use credit. Third, it encourages financial institutions to offer credit because the risks of crop loss are indemnified.

Like all traditional crop insurance it depends on the yield outcome on the particular farm/crop insured. Therefore, it suffers from the costs associated with moral hazard (lack of incentive to minimise the risk once insured) and adverse selection (farmers understand the risks better than insurers, and have an incentive to insure riskier prospects when premiums are set at average risk levels). Moreover, the administrative costs of damage inspection on individual properties can be prohibitive for this type of indemnity insurance.

Weather Index Insurance (WII) can overcome these problems. Payout from a WII depends not on events on an individual farm, but on a regional weather outcome. This avoids the costs of moral hazard and reduces the costs of adverse selection and administration. However, a drawback is that there is potential for basis risk (the risk insured isn’t precisely the risk faced by the farmer) with WII, because any insurance payout will depend on weather events recorded at a regional meteorological station and not on the farm insured. To keep such basis risk to manageable levels may require inexpensive, more localised weather recording, and crop cutting experiments to fine tune the rainfall index.

WII has been conducted in India and parts of Africa. Also a trial has been underway in the Philippines. Administratively, it would fit easily into the current administrative arrangements of the PCIC for rice and corn, particularly in relation to the sharing of premiums between the farmer, credit institutions and the government.

Buyani Thomy and Kevin Parton have pursued three lines of research. First, an assessment of the general conditions that influence the success of a WII scheme for agricultural crops. Second, an investigation of the developments in WII in the Philippines and the steps needed next to establish a successful WII scheme for rice and corn. Third, a review of whether seasonal climate forecasts would be expected to influence the operation of a WII scheme for rice and corn in the Philippines, for example in relation to premium setting.

The analysis is still in progress, but results so far are promising. WII trials, conducted in the Philippines have been extremely useful in clarifying the conditions that are necessary for establishing a WII scheme. These include having localised weather information, within approximately 25km of the farm being indemnified, using crop cutting experiments to clarify the localised impact of rainfall deficiencies on yield and having a rapid assessment of the expected insurance payouts. A research report has been written containing a series of recommendations for further development of WII in the Philippines.

An ongoing problem for insurance in a complex archipelago like the Philippines is finding representative stations. Currently there are 58 synoptic stations with 20km area around the station being included. In some cases where these stations are on coastal plains the 20km radius can include the ocean to one side and mountains on the other. Another common issue with crop insurance that is subsidised by the government is that the main beneficiaries are larger land holders. This is partly addressed by the policy of initially having 7ha free which is reduced to 3ha and then down to 1.5ha.

The question of multi-peril crop insurance is commonly raised in the Australian context. Professor Kevin Parton, Dr Buyani Thomy and Dr Peter Hayman attended a workshop on managing climate risk in agriculture as part of the Australian Agricultural and Resource Economics Society in Adelaide in February 2018. Most of the presentations in the workshop focussed on insurance.

## Capacity impacts

This phase of the project has seen interaction with regional universities. During the scoping phase, a number of high ranking officers from the Philippine Department of Science and Technology (DOST) made the point that too much capacity building is focussed on Manila and surrounding areas rather than regional universities.

Although there is a large administrative load to establish contracts with regional universities, the project is enriched by the substantial localised knowledge. Resources from this project have enabled Philippine partners such as PIDS and UPLB to take the lead in capacity building with regional universities.

PIDS have developed close ties with Benguet State University with a number of field trips and an official signing of a memorandum of understanding. Likewise, following the successful kick off meeting at Calapan city, UPLB have established close ties with the Mindoro State Agricultural College (Minscat) which included a deliberate capacity building workshop.

As indicated in the previous report, the Philippine teams are starting at a high capacity level. Attachments 1 and 2 represent substantial writing efforts from PIDS and UPLB. Many sections of these documents have been reviewed by Professor Kevin Parton.

This project is multicultural and multidisciplinary. There are capacity benefits from the multidisciplinary nature where climate science is interacting with economics and both are interacting with other social sciences.

## Community impacts

### Economic impacts

It is too early to claim economic impacts. The case studies and the decision analysis framework will point to climate sensitive decisions where information from PAGASA will be most effectively applied.

### Social impacts

Climate and weather risks have an impact well beyond the economic impact. The survey work continues to identify the difficulties resource poor farmers find in accessing insurance and in some cases even being aware of their rights.

### Environmental impacts

## Communication and dissemination activities

The official project launch for the collaboration with Mindoro State College of Agriculture and Technology (MinSCAT) was held in Calapan, 17th October 2017 in conjunction with a Provincial Climate Forum (see Attachment 2). In attendance were 20 rice farmers from Calapan City and 10 corn farmers from the municipality of Gloria, as well as representatives from the Local Government Units of Calapan City and Municipality of Gloria, Ms. Maria Rassel Faylon (Assistant Country Manager of ACIAR) and members of the project team from PIDS, PAGASA, UPLB, ATI and SARDI. The afternoon included lectures and workshops run by PAGASA on their products and services as well as information on ENSO, climate projections and weather and climate outlooks for the region. A highlight was a pen and paper typhoon tracking exercise undertaken by the farmers to help them understand the reports being provided by PAGASA during typhoon season.

A two-day seminar-workshop entitled, “Capacity Development on Climate Change and Disaster Risk Reduction and Management” was held for representatives from MinSCAT and LGUs on March 22-23, 2018 at MinSCAT Calapan. The event aimed to contribute to the project’s goal of increasing capacity in regional institutions (eg MinSCAT) and LGUs to provide better climate information to smallholder farmers, and included training from the UPLB project team on climate change science and survey design and implementation. A further training seminar was held by UPLB at MinSCAT on May 2-4 2018 to prepare MinSCAT enumerators for effectively conducting the one-on-one project surveys with farmers (Attachment 2).

# Training activities

On Wednesday 22 May 2018 Peter Hayman ran a short course on the use of Rapid Climate Decision Analysis at PIDS for researchers from PIDS, PAGASA and Benguet State University.

This exercise involved showing the framework for a decision in Australia between a high risk high return crop (lentils) and a lower risk, lower return crop (field peas). This exercise was followed by an example from Benguet of using temporary covers for cabbages (see Attachment 5).

# Intellectual property

# Variations to future activities

No major variations

# Variations to personnel

Ms Mia Aranas played a major role within UPLB with taking the lead on the economic analysis of decisions in corn farming and organising the succesful kickoff meeting in Mindoro in October 2017. Ms Pamela Nilo has now taken over this role as Research Assistant with UPLB. Dan Diona has continued in the role as research assistant which provides some continuity.

Mr Adrian D. Agbon was Research Associate with PIDS until June 2018. He has been awarded a schlarship for a PhD in water economics in Belgium. Adrian was heavily involved in the research into understanding climate sensitive decisions in Benguet. PIDS are in the process of employing a new Research Associate.

Dr Buyani Thomy, Faculty of Business at Charles Sturt University, Bathurst has played a valuable role in the project for 12 months from March 2017 to March 2018 through a literature review on DRR and CCA in the Philippines and co-authoring the detailed study on crop insurance with Professor Kevin Parton.

# Problems and opportunities

There are still ramifications of the slow start to the project, especially the late start for UPLB. However, the substantial report from UPLB (Attachment 2) is indicative of the substantial contribution that they have made and this complements the work from PIDS. We recognise that we have focussed on farm level decisions and will need to look at other levels (LGU and value chains). One advantage of the Rapid Climate Decision Analysis framework is that it quickly gets expert opinion about the relationship between climate and profit in a form that can be examined and made available for early assessments of the value of climate information.

As discussed with Mai Alagcan (country manager, Philippines) in May 2018, we have had challenges with the engagement of ATI. Our understanding is that the problem relates to a finding from the Philippine Commission of Audit regarding funds from any funding agency to ATI. Although ATI have always been the minor partner in the project, staff have been present at meetings, returned emails and contributed to discussion. Recent emails indicate that the Commission of Audit ruling will not apply to this ACIAR project.

Although all the activities of this project are in the Philippines, Kevin Parton with CSU colleagues and Peter Hayman with SARDI colleagues maintain active research programs in Australia. SARDI Climate Applications was successful in applying for a 2 year Grains Research Development Corporation project on seasonal climate forecasts for the Southern Grains Industry. Over the last six months the Rapid Climate Decision Analysis framework has been applied in both the Philippines and the Australian southern grains region. We have made it clear to GRDC that resources for this framework have come in part from this ACIAR project. As mentioned in the previous annual report, The Managing Climate Variability Program has been successful in obtaining funding for a Rural R&D for Profit Program for 5 years from July 2017 on managing climate extremes titled, “Forewarned is forearmed”. This new project is $6M funded (with $6M in-kind) and will be led by the Bureau of Meteorology, but with input from Grains, Meat, Dairy, Wine, Rice, Sugar and Pork RDCs. Peter Hayman is funded 20% FTE as part of this project and there are synergies with the ASEM 2014 051 project.

# Budget

Reasons for the project being underspent:

1. As mentioned in previous reports, due to the late start to the project the milestones and payments to the Philippine Institutions were agreed to be 6 months later (finishing July 2020) than the original budget, but the payments from ACIAR to SARDI will still be completed by December 2019.
2. There were funds set aside for engagement with regional universities from the start of the project, however these were delayed due to sorting out case study sites and setting up extensive contracts with the collaborating Universities.
1. Andrew Campbell: Fund the arrows not the boxes <https://www.youtube.com/watch?v=krggzQ6hcWA> [↑](#endnote-ref-1)