DECISIONS FOR THE DECADE:
A Game on Deep Uncertainty and Robust Decision Making

THE WORLD BANK

RED CROSS/RED CRESCENT CLIMATE CENTRE

International Federation of Red Cross and Red Crescent Societies

The Netherlands Red Cross

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

1. INTRODUCTION

The World Bank Office of the Chief Economist for the Climate Change Global Practice Group has been developing a toolkit of analytical and experiential products to acculturate World Bank staff and clients to new methods and paradigms for dealing with "deep uncertainty". Deep uncertainty refers to those situations in which analysts do not know, or cannot agree on (i) models that relate key forces that shape the future, (ii) probability distributions of key variables and parameters in these models, and/or (iii) the value of alternative outcomes (Hallegatte et al. 2012, see http://elibrary.worldbank.org/doi/book/10.1596/1813-9450-6193).

Deep uncertainty is pervasive, challenging decision makers around the world. Yet such uncertainty is difficult to acknowledge, understand, and manage. We are more comfortable facing risks we can quantify, and solving problems for which we have familiar well-honed tools. Under such pressures, robust decisions can be elusive. Sociopolitical expectations compound this problem: Analysts and decision makers routinely face pressures to demonstrate that a decision is risk-free. Political and cultural expediency press them to ignore rather than acknowledge uncertainty and thus present their decision as advantageous and certain.

It is rare for decision makers to seek out and promote robust decisions, even though in practice it may be easier to build consensus around them. As the world's largest development lending institution, the World Bank grapples with these challenges daily. The CCG Chief Economist's team seeks to illuminate the issue by:

- In the long run, seeking to mainstream new approaches for robust decision making (RDM) into the design and implementation of WB projects, as well as into the analytical methods and policy processes of clients.
- In the short-run, educating various audiences about deep uncertainty, how managing uncertainty differs from managing risk, and what tools are available to support RDM.

In the past, researchers and practitioners have relied largely on lectures and publications to communicate to decision makers both the problem of deep uncertainty and the concept of robustness as a way to manage it. This unidirectional format has the shortcomings of most prevalent forms of engagement. Unfortunately, the cost of failing to successfully reach the target audience is high. Governments and institutions around the world commit to spend billions of dollars annually in long-term investments for which managing deep uncertainty is essential. Climate change looms large as a new kind of emergent threat that cannot be managed with traditional approaches to risk management based on refining probabilities and projections.

In the past year, the Office of the Chief Economist has turned to serious games as a way to enable stakeholders to experience and come to grips with these challenges first hand. With generous funding from the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), the World Bank invited the Red Cross / Red Crescent Climate Centre to collaborate with the Chief Economist's team to develop a game for achieving three objectives:

1. Demonstrate to players the necessity of balancing the value of knowledge with the risks arising from overconfidence in knowledge, either when (a) assuming that a modeled probability distribution function (PDF) is the real-world PDF; or (b) assuming that it is always possible to assess the PDF, even for unknown or ill-known processes.
2. Introduce players to alternative decision-making approaches in a context of uncertainty (i.e. when the PDF cannot be determined) and demonstrate that these approaches are both common in everyday life and no more complex than standard probabilistic/optimization approaches.
3. Demonstrate that the robustness of a policy/intervention portfolio depends on assessing the level of uncertainty (including the appropriate degree of confidence in knowledge).

The game principally targets development practitioners (e.g. World Bank task-team leaders) and government technical experts. It was designed in the context of a planned daylong RDM workshop and can be delivered between approximately 2 to 3 hours for gameplay and debrief discussion. The chief result of this collaboration with the Climate Centre is "Decisions for the Decade".

2. BRIEF DESCRIPTION OF "DECISIONS FOR THE DECADE"

In *Decisions for the Decade*, each participant is a provincial governor and small teams make up the governing body of a nation. Central to the game experience is that participants do not initially recognize the likelihood of disasters as deeply uncertain and, like many decision makers in the real world, plan for the most likely disaster scenarios rather than for extreme events that can bring devastating outcomes.

All participants begin the game with a budget of ten beans (for a ten-year cycle), and seek to maximize the prosperity of their province and country by investing their budget in long-term development. However, floods and droughts can threaten this investment. The threat of extreme events is initially depicted by a six-sided die, introduced to players as the probability distribution function of precipitation based on the past record (a 1 represents a drought, a 6 a flood). Governors may choose to allocate a portion of their budget to disaster protection to avoid humanitarian crises – investing one bean offers protection against one extreme event. If each extreme event that occurs during ten rolls of the dice is matched by a corresponding protection investment, their development investment leads to prosperity, and the player will accrue *Prosperity Points*. However, if they incur a crisis (for example more floods occur than flood protection beans invested) all of their development investment for the decade is diverted to crisis management, and the prosperity of their province does not increase.

After three ten-year cycles, the winning provinces are those that have accrued the most Prosperity Points while having simultaneously avoided crises. Importantly, unknown to the players, the object representing rainfall is changed at the start of each new decade: the six-sided die is first replaced by an eight-sided die (a flood occurs if the roll is 6 or more: i.e. a probability of 3/8, or more than double the original probability of 1/6); and then by a truncated cone that is nearly impossible to understand in terms of the chances of falling on the big base (representing floods) or the small base (representing droughts) vs. landing on its side (good conditions). As with actual climate projections for much of the world, different players formulate very different interpretations of whether future conditions are likely to become wetter or drier, and as a team they have a chance to reflect on how to manage the emergent deep uncertainty.

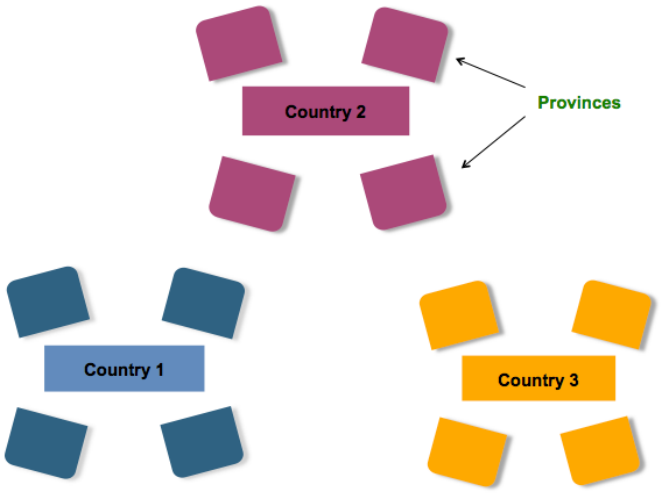
The game offers participants robust options, which are insensitive to the probabilities of disasters, but which also have a lower payout than would an optimized investment if these probabilities were known. In other words, the robust options work well no matter what the disaster regime, but they may not be the best in any single predicted regime. The game further invites urgency, as scientific information changes during game play, and conflict, as certain decisions require consensus in the face of diverging beliefs about the scientific information.

3. GAME RULES

Setup and Materials

The activity is designed to enable the active and meaningful participation of 8 to 60 people. It requires teams of 4 to 6 participants (each representing a 'provincial governor) sitting around a table representing the country. The game can be run by just one facilitator, although it can be beneficial to have a support team of 2-3 facilitation assistants to support the set up, gameplay and debriefing.

The total duration of gameplay plus debriefing can range between 45 minutes and 2 hours, depending on total number of participants, facilitator's experience, and desired depth of discussion during both gameplay and debriefing.

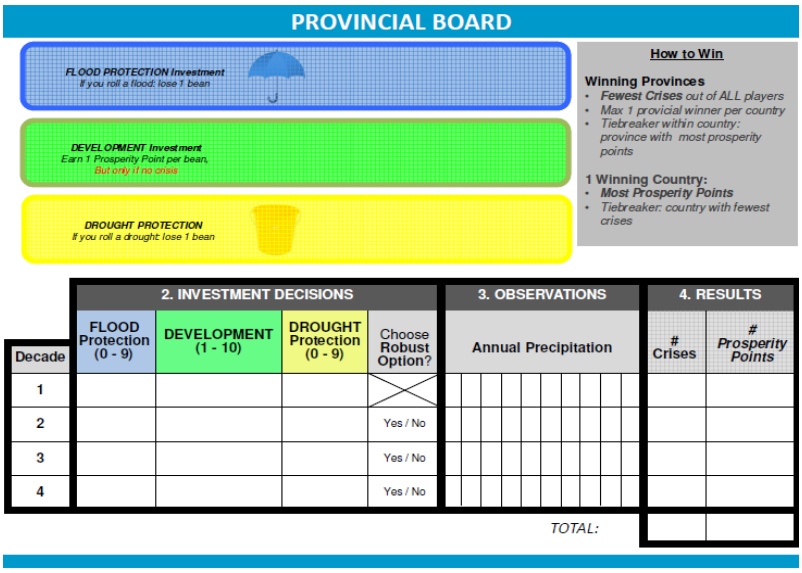


Each player requires:

- 10 beans
- A player board

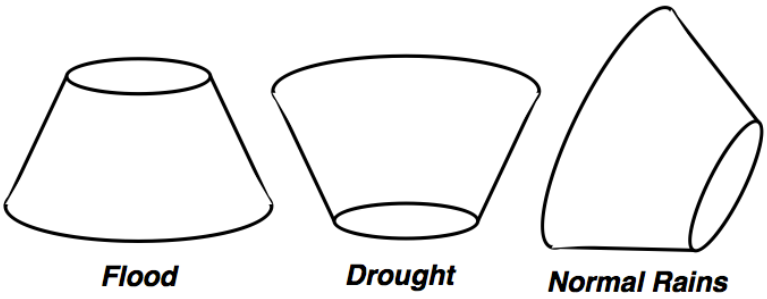
Each team of 4 to 6 players sits around a table and requires:

- 10 beans
- A team board
- About 15 red stones, representing "crises"
- A normal, six-sided die to represent normal rainfall. A value of 1 represents drought; a 6 represents a flood.
- A special, eight-sided die (available in game stores). A value of 1 represents drought; a 6 or more represents a flood.



The facilitator requires:

- Set of 'robust investment' cards: about one for every 3 players
- A 'cone of uncertainty'
- Powerpoint file to support explanation of rules
- Prizes: one small prize per team (for best province in each country) plus one larger prize (for best country)



Game Flow

The powerpoint file provided as an attachment includes notes in most slides, with proposed wording to help the facilitator explain the rules and introduce the different elements of the game as the decades progress – all in the context of a broader workshop about deep uncertainty and robust decision making.

During the introduction, the facilitator highlights that "Decisions for the Decade" is an intensely interactive game designed to support learning and dialogue about key aspects of long-term investments under uncertainty. The game is a simplified representation of reality (no challenging of rules please), and involves the links between limited information, rapid decisions, and consequences. The activity becomes increasingly fast-paced, and designed to take participants to the edge of tolerable confusion in a context of serious fun.

Each player takes on the role of a provincial governor. All participants share a simple and noble goal: to create a prosperous province and nation over the coming decades. The winning country will be the table of 4-6 players with the most prosperity points (if there's a tie, the country with the fewest crises wins). Within each country, the winning province will be the player with no crises that has the most prosperity points. There are prizes for the winners.

The vision can be challenged by the risk of devastating floods and droughts. If in any given decade the number of extreme events surpasses the investments in flood or drought protection, all development is lost and humanitarian crises occur. All provincial governors with one or more crises will likely be labeled as losers by their suffering populations…

The game is played in four cycles, each representing a decade – or until time runs out. Within each decade, there is a sequence of four phases: *Scientific information, Decisions, Observations,* and *Results.*

1. Scientific Information: Facilitator describes of what is known about probabilities of extreme rainfall for the coming decade. The first decade is a practice cycle using the six sided die ("normal rains based on the past record of precipitation"). The second decade also uses the six sided die, and introduces the "robust option" card. The third decade imposes changing climate risks (in the form the eight-sided die, introduced after year 2). The fourth and final decade involves the "cone of uncertainty" to elicit different estimations of flood and drought probabilities among players, thus allowing for the emergence of deep uncertainty and the stronger consideration of the robust option.

2. Decisions: First, each provincial government player individually decides how to invest their ten beans – no consultation allowed. The beans can be allocated to protective investments (flood or drought), productive/development investments, or the robust option. Staring in the second decade, the facilitator introduces the "robust option" cards, which represent a climate-independent investment that regardless of observed rainfall offers a guaranteed quantity of prosperity points in exchange for ten beans (the facilitator announces the 'prosperity points' benefits of these cards each decade at his or her discretion – a value of 2 or 3 is recommended). Players without the "robust option" must allocate at least one bean to development investment. Then all players in a table collectively make investment decisions for the country (default option is that all beans are allocated to "development": only if there's consensus can any other choice be made). The facilitator imposes a firm, tight deadline for these two investment stages. Players document their individual and collective choices on the corresponding board.

3. Observations: After the investment deadline, each team rolls the rains ten consecutive times, representing ten years. Every time a flood happens, provinces and countries without the "robust option" must remove a "flood protection" bean from its place and relocate it to the 'used beans' sector of their board. Similarly, every time a drought happens, players without the "robust option" must remove a "drought protection" bean. Whenever an extreme event happens and no protective beans are available, a "crisis" occurs: All development beans are lost, and a red stone must be placed on the board. If no crisis takes place by the end of the decade, the beans allocated to "development" are counted as 'prosperity points'.

4. Results: Players document their individual and collective outcomes on the corresponding board, and briefly discuss the links between information, decisions and consequences. When relevant, the facilitator invites players to share observed events, insights or questions.

Game end: Upon the facilitator's decision to end the game, the winning country and provinces are determined, prizes are given out, and a debriefing begins to elicit emotions and insights – preferably regarding uncertainty and robust decision making. Given the goals of the World Bank SDNCE, the best moment to end the game is during the fourth decade, right after the "decisions" phase (before tossing the cone of uncertainty). This is one of the moments of most intense thinking and reflection about the challenges of estimating probabilities in a context of deep uncertainty. It allows for participants to be left with the vivid feeling of deep uncertainty, enabling richer discussion during debriefing. After the end of the game, the facilitator can share any additional insights and thank participants for their involvement.

4. GAMEPLAY SESSIONS AND PUBLICATIONS

"Decisions for the Decade" has already been played with a variety of audiences. In December 2013 it was used in Peru to launch a collaboration with stakeholders on using Robust Decision Making to ensure long-term water security. Participants included diverse backgrounds and interests, including technical staff from the water utility, officials from the National Water Authority, leaders at the private hydropower company, and representatives from local NGOs. In January 2014, it was used in Colombo, Sri Lanka at a kickoff workshop for a master planning effort on flood risk and wetland management; it was also used at a meeting of lead coordinating authors of the

Integovernmental Panel on Climate Change (IPCC), where a modified version of the game incorporated the actual graphs of the IPCC Summary for Policy Makers to integrate risk and uncertainty considerations in investment decisions.

Feedback from the game sessions reveals that this intensely interactive approach whets participants' appetites – intellectually and emotionally – for an in-depth presentation and discussion on deep uncertainties and how to manage them in real world settings. The game primes participants to think about the unknown, to challenge each other on assumptions about the future, and to explore how different types of analyses – in particular those that focus on robustness -- can help address the changing challenges they face.

As one example, a participant in one gameplay session remarked, "At first I thought it was very unfair to change the probabilities of the disasters, but afterwards, I realized that this happens in the real world all the time. We have to plan for surprises." At another event, a participant noted, "Without the game, we don't get a feeling of uncertainty. We always make decisions based on the past. This is not the correct approach," and, in reference to their mission of flood risk management, added, "We need to know what the robust flood risk actions are for us!"

Decisions for the Decade has been included as a case study in the manuscript entitled "Loss and damage in a changing climate: Games for learning and dialogue that link HFA and UNFCCC", coauthored by Pablo Suarez and Nidhi Kalra and submitted as an input paper to the UNISDR Global Assessment Report on Disaster Risk Reduction 2015 for the GAR Thematic Research Area 17 on adaptation and mitigation in the context of the HFA (see Annex I). An additional manuscript is currently in preparation for *Nature Climate Change.*

The "Decisions for the Decade" game was designed by Pablo Suarez and Janot Mendler de Suarez (Red Cross / Red Crescent Climate Centre) for the World Bank Chief Economist for Sustainable Development/ Climate Change Global Practice and the Green Growth Knowledge Platform, with support from the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.