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# WeShareIt Game: Strategic foresight for climate-change induced disaster risk reduction

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**Abstract**

Nile Basin policy makers, at all levels, are constantly making quick decisions to address emergencies. The decisions are made in the context of a complex, uncertain, ever-changing and highly volatile basin. However, for these decisions to take into account future uncertainties, like climate-change induced disasters, policy makers need to enhance their capacity in strategic foresight. Strategic foresight helps them make more robust decisions that take into account deep uncertainties and thus buffer the basin from future natural disasters. The authors explore the contribution of serious gaming in enhancing the Nile Basin policy makers' capacity on strategic foresight. They present the findings from the application of a game-based, experimental study of a serious game known as WeShareIt. WeShareIt was played in Nairobi on 22 October 2015 by 11 participants from the Kenyan Ministry of Water and Irrigation and Moi University Centre for Public Sector Reforms. Data on the added value and contribution of the game to increased strategic foresight and disaster risk reduction were collected using pre-game, in-game and post-game questionnaires, together with a debriefing session and observations. The analysis shows that strategic foresight is an important element for effective disaster risk reduction. Observations in the game-based intervention provided evidence that the participants engaged in short term quick decision making and were not prepared for life-threatening natural disasters. The results of the experiment support the conclusion that serious gaming may be an effective and promising method for enhancing the capacity of policy makers on strategic foresight so as to prepare them for future climate induced natural disasters.



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*Keywords:* Strategic Foresight; Adaptation; Climate Change; Disaster, Risk Reduction; Decision Support; Serious Gaming; Deep Uncertainty; Nile; Water Management

## 1. Introduction

Policy making in Africa is a difficult role that often requires urgent decision making. Most of these decisions are aimed at addressing already occurring calamities. Therefore, African policy makers are constantly submerged in current affairs with limited room for strategic thinking and planning. Quick decision-making lacks strategic foresight, which is needed for disaster risk reduction. Coates (2010) defines foresight as "an image, an insight, a picture, a concept about some future state or condition" [1 pp.1428]. He further elaborates that this future normally comprises of a timeline of five or more years. Strategic foresight is distinguished from the normal operational planning by the breaking point of five years. The value of strategic foresight is: it broadens and enriches the traditional planning process; supports the process of adapting despite deep uncertainties; helps to better anticipate unexpected circumstances; stimulates creative thinking and broadens the number of futures and possible actions. Vechiatto (2011) explored how strategic foresight has been used by big international industries (Royal Dutch Shell, Nokia, BASF and Philips) in coping with environmental uncertainty [2]. After a thorough analysis of these industries, the paper concluded that the fundamental contribution of strategic foresight to these industries was not only to predict the future but also to prepare

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managers and policy makers in these industries to be well prepared to cope with the future uncertainties. One of these future uncertainties is climate induced natural disasters.

In this paper, we draw on the outcomes of applying the WeShareIt board game, as well as previous research and our own experiences on strategic foresight and disaster risk reduction, to answer one question that appears relevant to this special issue. We consider how serious gaming can contribute to strategic foresight of policy makers on climate induced disaster risk reduction. The research question that we sought to answer was: What is the contribution of the WeShareIt game to strategic foresight of Nile Basin policy makers on climate change induced disaster risk reduction? To answer this question, we conducted a game session with 11 participants from the Ministry of Water and Irrigation and Moi University Centre for Public Sector Reforms, in Nairobi Kenya. If accurate, the results of this paper can be used as a powerful tool to enhance learning on strategic foresight and its link to disaster risk reduction. Although the conclusions apply to the Nile Basin and cannot be juxtaposed on other river basins; we know that the issues that the paper addresses are generally recognized in various river basins. It is our hope that this article will contribute to developing a better understanding of the extent to which serious gaming can be used in the Nile basin and other river basins to enhance strategic foresight capacity and improve risk reduction of climate induced disasters.

## 2. Background Information

### *2.1. Nile Basin Climate-change Induced Natural Disasters*

The Nile basin occupies one-tenth of Africa's landmass and comprises of eleven riparian states [3]. The 11 states are: Burundi, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, South Sudan, Sudan, Tanzania and Uganda. The basin is highly susceptible to climate induced natural disasters [4, 5]. According to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, African countries may experience high temperatures, decline in groundwater recharge, sea level rise, floods, droughts and desertification [6]. Martens (2011) states that a 1% temperature rise would lead to high levels of evaporation and a subsequent decline in the Nile flows [7]. Sterman (2009) explains that increased evaporation will lead to water stress in many parts of the basin [8]. According to the United Nations Economic Commission for Africa, none of the eleven Nile Basin countries will be able to meet their water needs by 2025 [9]. Increased water stress will have a high impact on the agricultural sector. Agriculture contributes between 12 percent and 43 percent of the Nile Basin countries gross domestic product (GDP). In addition, it provides employment to approximately 32% to 94% of the Nile Basin labour force. Water stress would lead to food insecurity, loss of livelihoods, decrease in the GDP and even loss of life.

The identified climate change hotspots in the basin are: the Nile Delta, the Nile valley, the Ethiopian Plateau, the Nile confluence, the Sudd and Mount Ruwenzori. The Nile Delta is sinking by 5 mm per year and threatening the lives and livelihoods of the 39 million Egyptians living in the Delta. Recent satellite imageries confirm that the lakes in the Nile Valley are drying thus leading to salt intrusion, biodiversity losses and water stress. Many streams in the Ethiopian plateau which is the main water tower that contributes 86% of the Nile annual flow, are drying. The largest wetland in the Nile Basin, the Sudd swamp, losses more than 50% of its inflow to evaporation, thereby leading to water stress. Mount Ruwenzori is an important water tower for the Nile Basin. Satellite images that were taken in 1995 and 2012 show a recession of the mountain glaciers. UNEP (2013) states that as the recession continues, the glaciers will disappear in 20 years [3].

To address the above uncertainties that pose a great threat to the basin, the Nile Basin governments under the umbrella of an inter-governmental body known as the Nile Basin Initiative (NBI), developed the Nile Decision Support System (Nile-DSS). The Nile DSS comprises of multiple modelling and information management tools aimed at supporting decision making [10]. It was completed in December 2012 and is currently being rolled out and the relevant government officials are being trained on its use. Through the Nile-DSS, riparian states are expected to have a better understanding of the river system, identify extreme events and make more informed decisions. However, the Nile Basin climate change challenges, as explained above, are as a consequence of very complex issues that are barely understood and cannot be completely represented in a decision support tool. The Nile- DSS is important in providing pertinent information that is required for informed decision making, but it is not sufficient to address complex problems. To be successful in addressing the climate change challenges, Nile Basin countries should divert some of their resources away from predicting the future towards enhancing continual individual and organisational capacities to adapt to environmental changes. To be able to effectively adapt to one's environment, one has to learn to shift away from current practice towards being more adaptive. Adaptive learning is not easy to grasp and internalise, it therefore requires an effective learning tool [11].

### *2.2. Effective Learning through Serious Gaming*

This sub-section explains why serious gaming leads to effective learning. Wenzler characterises effective learning through four elements; visioning, knowledge of plausible futures, social learning and impartation of confidence while making decisions [12]. We expound on the four elements in relation to the PhD focus area. First, the Nile policy makers need to comprehend the big picture around climate change induced disasters. Many have termed this as 'think globally and act locally.' The parts of the Nile Basin system can only be understood when the person making the decision also has a picture of the entire sum of these parts. Second, the policy makers should be able to understand the plausible futures of the Nile Basin system. In complex basins,

there can never be one future, therefore decision making cannot rely on predictions because the futures are deeply uncertain. Plausible futures enable a policy maker to develop policies that take into account all these futures. Third, social learning (learning together as one community or organisation) is imperative for learning to be effective. Decision support tools are mainly designed for water manager while the policy makers barely understand them nor use the information emerging from these tools. That is why there is need for tools that facilitate collaboration between policy makers and water manager and facilitate social learning. Fourth, effective learning is being able to confidently make decisions in the middle of deep uncertainty. Many policy makers are still waiting for scientists to predict the future so as to guide their decision-making. Effective learning is learning that there will never be such a clear print in complex systems and confidently making the decisions without a clear print.

Serious gaming was selected as the tool to facilitate effective learning because it satisfied all the above four elements. First, serious gaming provides the opportunity for policy makers to envision futures and detect the important aspects of climate change induced disasters in the Nile Basin. In a playful manner, the players build cognitive pictures of the futures, the path towards those futures and the strengths and weaknesses of each possible path. Second, serious gaming enables players to assess possible policies, strategies and approaches in a safe environment. Since the players are testing various options, they are constructing diverse time paths which are stored in their minds [13]. This stored information is extremely useful, in the future, when they have to make quick decisions because the cognitive time paths are immediately made available in a crisis context, to support quick decision making. Third, multi-player, multi-actor collaborative games are designed to facilitate social learning. These games can develop a learning environment where the players: share knowledge and information (including implicit knowledge), develop a shared understanding on Nile Basin climate induced disasters and produce innovations to reduce the risks. Fourth, people need the confidence and surety that the decisions they make will be successful. This is hard in real life because decisions always have to be made before the impacts are felt. Serious gaming provides a safe environment where one can simulate real life and through playing multiple rounds one gains confidence that the strategies that can be employed to help them succeed or fail. A game session also enables participants to easily embrace change in real life, which they have already embraced in a virtual setting and it led to successful outcomes. This gives them the confidence to adapt and make decisions amidst deep uncertainties.

### *2.3. Climate Change Games*

The history of climate change games dates back to 1983 when a game framework for generating CO2 scenarios, was developed [14]. However, according to Reckien and Eisenack (2013), the most important changes in climate change gaming have taken place since 2002 because before then they could only identify five ‘sophisticated’ games on climate change [15]. These games are in many formats (card, board, simulation, video, online, mobile and role play) and sometimes a mix of various formats. The highest number of climate change games are role play games; followed by online games. Based on the study by Reckien and Eisenack (2013), climate change games normally focus on two topics: the international climate change negotiations and support to individual decision making so as to reduce carbon emissions. The core focus of most climate change games is mitigating green gas emissions [16]. These kind of games are not relevant for most developing countries. This is because many of the developing countries’ current climate change challenge is adaptation and not mitigation. In addition, recently, the developed world has been shifting attention away from mitigation and towards adaptation.

Less than half of these climate change games incorporate adaptation [16] and most of these games are new (for example, FLOODING, 2013) [17]. A few of the climate change games are dedicated to disaster risk reduction (for example, BEFORE THE STORM / EARLY WARNING, EARLY ACTION, 2009) [18] . A common theme that is addressed in most climate change games is political decision support at both the international and local level. The decision support games mainly focus on international negotiations (for example, WORLD CLIMATE) [19] and adoption of appropriate mitigation technologies (for example, PLANET GREEN GAME, 2007) [20]. Decision support for disaster risk reduction is not addressed in these games. Water management is also barely an area of focus under climate change apart from very few games (for example, AQUA-PLANNING and FLOODING) [21, 22]. The interaction between climate change adaptation, disaster risk reduction, water management and decision support, in one single game, is lacking in most of the current climate change games.

### *2.4. Nile Basin Games*

These a few Nile Basin games that have been designed and played in the past. Examples include the HAPPY STRATEGIES GAME [23] and WAT-A-GAME [24]. These two games are mainly in the realm of civil engineering and are designed to help the water managers better manage the water resources. However, there is no existing Nile Basin serious game aimed at supporting policy makers to make optimal decisions to prevent or reduce the impact of disasters. The only Nile Basin decision support games we could be find are in cooperative game theory, not serious gaming (Wu and Whittington (2006) [25], Elimam et al. (2008) [26] and Dinar et al. (2013) [27]).

## 3. Method: The WeShareIt Game Application

### *3.1. WeShareIt Basic Information*

WeShareIt is a computer assisted board game aimed at enhancing capacity in strategic foresight through constant development of strategies to balance energy, food and nature needs, both at the national and basin level. WeShareIt is a collaborative game that is designed in a manner that encourages policy makers to come out of their comfort zones and seek strategic partnerships with other riparian countries. These partnerships are based on their respective comparative advantages (upper riparian countries are better placed to grow food crops and Ethiopia and DRC have the capacity to provide hydro-electric energy for the entire basin). The highest gains are made when all the countries collaborate early and pull all their resources to strengthen their positions, in preparation for future uncertainties. If the countries lack strategic foresight it will lead to unilateral actions that meet the current needs but cannot buffer the basin from future disasters. Through the disaster round, each country can assess whether they lacked strategic foresight and learn on how they can improve their strategies in the subsequent rounds.

The game was developed by Abby Onencan, a PhD fellow in the Delft University of Technology. The original ideas of this form of board game was derived from a CE Delft game known as BIOMAdneSS. BIOMAdneSS focuses on the five continents as opposed to the five Nile Basin countries, on the spatial scale and biomass as opposed to water on the stake/issues scale. The initial prototype was tested by CE Delft, the Delft University of Technology and Moi University Centre for Public Sector Reforms, in three successive game sessions. Based on the outcomes of the three game sessions, the game was redesigned so as to ensure that it meets its planned goal, when applied by the Ministry of Water and Irrigation.

### *3.2. WeShareIt Game Mechanics*

The design of the game mechanics was guided by Fennewald and Kievit-Kylar (2012) so as to effectively simulate a climate change environment [28]. These mechanics are explained below:

1. **Nonzero sum Interactions**: The goal of the players is to gain as many "happy faces" as possible, from their citizens. The boards are different and the rules applied for each player is different, therefore there is no winning and losing in the game. The game can be played in five teams, comprising of a minimum of one person and a maximum of three persons.
2. **Multiple and Diverse Actors**: The game comprises of five select boards for countries (Egypt, Ethiopia, Nile Equatorial Lakes Region, South Sudan and the Sudan). The players can be five or any number in the multiple of five (they then play in teams). The players have different powers, resources, strengths, abilities and objectives. The players also have different national and regional strategies.
3. **Social Dilemmas and the Tragedy of the Commons**: The players have a choice to choose between long versus short term strategies and individual (national) versus collective (regional) interests. The countries also can choose between allocating water for energy, food or environment. There are penalties for the destruction of the environment beyond acceptable levels.
4. **Delayed Effect**: The game is played in multiple rounds so as to assess whether there is a change of strategy and learning. After three successive rounds, a drought or flood round is introduced where each country loses half of their water square. The delayed effects of the player's actions in the first three rounds are felt in the fourth drought or flood round.

### *3.3. Playing the Game*

The players are provided with boards, cards, tokens (food, hydro-electric power and nature) and money (Fig.1).

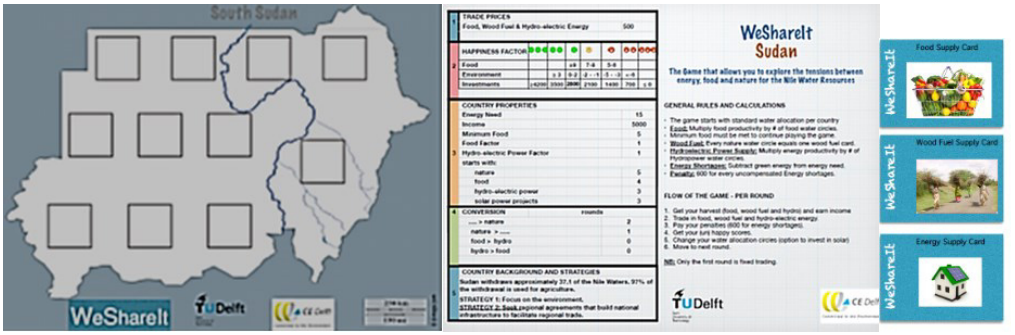


Fig. 1. (a) water allocation board; (b) information board; (c) playing cards.

The game is played in a series of rounds (maximum 20) and each round consists of six steps. First, get your playing cards and income. Second, trade in food, wood fuel and hydroelectric energy. Third, pay your penalties. Fourth, get your (un) happy face scores. Fifth, change your water allocation squares and buy solar panels (optional). Finally move to the next round. The player's initial challenge is to feed their citizens because if they go below the minimum food requirement, they have to stop playing the game. In addition, each country has a unique regional strategy that they are expected to accomplish. For example, Ethiopia's strategy is to increase its production of hydroelectric power and make regional agreements with other countries to trade in energy. These unique regional strategies, if effectively implemented by all the countries, help buffer them collectively from the negative impacts that are experienced in the disaster round. The results are recorded and projected on the screen. This information is provided on real-time so as to support decision making and improve strategies for the forthcoming rounds.

### *3.4. Game Evaluation*

We collected data on the process because the players were allowed to make new rules as they played. We also assessed the effects of the decisions made and the insights gained from the discussions during the interactions between the players. The following data collection methods were used to evaluate the WeShareIt game:

1. **Pre-game questionnaire**: This questionnaire collected data on participant's background (nationality, age, gender and experience on serious gaming), their knowledge and current involvement with the water-food-energy nexus and experience and their impressions on connective leadership capacity.
2. **In-game questionnaire**: This questionnaire collected the numerical data that were filled in an Excel sheet, for every round. In addition, players indicated what their strategy for that particular round was and the countries they traded with.
3. **Observations during the game**: We observed the manner in which WeShareIt was played, the interactions and self-organisation of the players, the content and policy measures that were taken, the problems identified and the strategies undertaken to resolve these problems.
4. **Post-game questionnaire**: This was filled in before the debriefing session. The questions focused on the player's opinion on; the game quality, the policy relevance of the game, the quality of support provided by the computer and facilitator, their assessment of the learning outcomes and the kind of capacity required to implement the water-energy-food nexus approach.
5. **Debriefing Session**: Each country was requested to express their impressions on the; experiences they faced during the game, lessons learnt and proposals to improve the game design and process.

### *3.5. Game Limitations*

The extent, depth and reliability of the results is good, but limited in some instances as explained hereinafter. First, the game was designed for four countries and one sub-basin. Eritrea was excluded from the boards entirely. It is not clear whether the inclusion of all the eleven countries on separate boards would result in different results. Second, the only Nile Basin country that the game was played was Kenya. It is not also clear what results would emanate from playing the game separately in the other ten Nile Basin countries or through a joint game session for all the eleven countries. Third, the game was played within one sector, the water sector. There is need to assess whether there would be divergent results, if all the relevant sectors played the game individually and / or jointly. In addition, the players were a small number that their contribution might not be representative of all the Nile Basin policy makers. However, the purpose of the game was to assess whether serious gaming can be used as a tool to enhance strategic foresight. The data received is sufficient to make assessments on change of knowledge and learning. On this regard, the data can be used to analyse whether serious gaming does have a potential to enhance strategic foresight.

The following section explains the results from testing the game and playing it in Nairobi.

## 4. The Results

### *4.1. Observations and Pre-Game Assessment*

The game was played in 4 rounds. The first round was to help the players understand the game better and the fourth round was a drought round. The players were very motivated and had a lot of fun playing the game. The overall assessment of the game was very good. The players requested that a follow-up game be played with all the Nile Basin riparian states. The pre-game assessment was in form of a questionnaire that was filled by 10 persons. One was a female and the other nine were male. The age range of the participants was between 18 and 54 with 4 people in the 45 to 54 age bracket and 3 people in the 25 to 34 age bracket. Of the ten participants, only three had no experience on serious gaming. 67 percent of the participants focused more on content in their leadership. They are the main target group that the game was designed for. This is because when they make policies and strategies, they tend to give more attention to support tools that will help them get more information to inform their decisions. However, in complex issues, content is not sufficient because of the deep uncertainties surrounding the information. Based on the leadership strategies the participants chose, it was clear that we had a team that is receptive to learning and open to change. This is because 78 percent of the participants stated that the leadership strategy that best describes them is: Dialogue, Decide and Deliver. They do not come to the people they lead with already designed strategies to either defend them or discuss

and adjust. They come with an open mind and take a more facilitative role that makes it possible for the strategies to be developed in an all-inclusive participatory process.

*4.2. Validity of the Game*

The validity of the game was assessed in various ways. First we asked the players after the game to assess the quality of the game in terms of the objectives, instructions, motivation, facilitation and feedback. The analysis shows that the players assessed the quality as very good (Fig. 2 a).

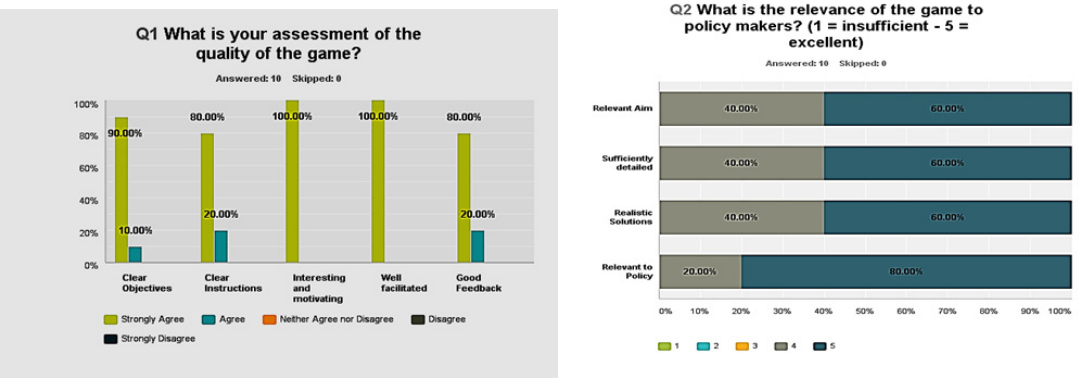


Fig. 2. (a) assessment of game quality; (b) assessment of relevance of the game to policy makers.

The second assessment (Fig. 2 b) centred on whether the game was a representation of the reality in terms of its aim, details, solutions and its current relevance to the Nile Basin policy. The players felt that it was a good representation of the aim, details and solutions. 80 percent of the players felt that it was relevant to policy.

The third question assessed the learning outcomes and the fifth, the facilitation role of the computer (Fig. 3). The assessment of learning outcomes looked at many components. First, and of interest to this paper were whether the game could be used as a decision support tool. 80 percent of the players strongly agreed that the game supported decision-making. Second, the game helped them to see the bigger picture and have a vision of the future. The players were able to see possible future conflict areas and future comparative advantages. Third, the game enabled the players to assess possible policies, strategies and approaches in a safe environment. 80 percent strongly agreed that the game increased learning on possible trade-off between energy, food and environment. 50 percent strongly agreed and the other half agreed that they understand more about the different options at the basin level. 70 percent strongly agreed that they understand more about the different options at the national level. Third, the game facilitated social learning. 70 percent of the players strongly agreed that through the game interactions they understood different stakeholder interests, possible conflict areas and areas of comparative advantage. Through the multiple players and multiple actors, the game enhanced the player's collaborative capacity (80% of the players strongly agree to this) and thus increased social learning.

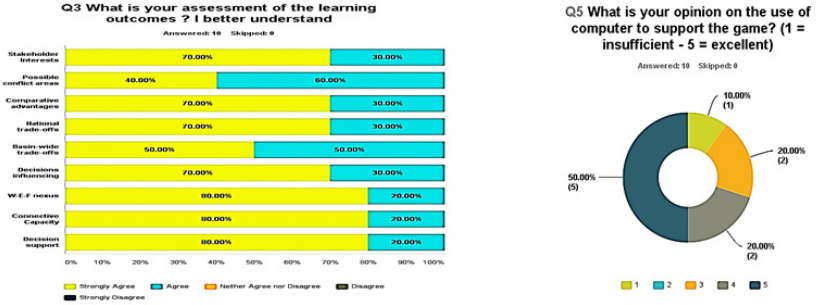


Fig. 3. (a) assessment of the learning outcomes; (b) the use of the computer to support the game.

In the fourth question, the results indicate an agreement by all players that decision making under uncertainty requires a policy maker who: (a) understands the subject-matter; (b) connects content with process; (c) connects boundaries; (d) is a skilled networker; (e) is proactive; (f) builds sustainable relationships; (g) stimulates informal interaction spaces; and (h) bridges informal network spaces. The sixth question (Fig. 4 a) looked at the collaborative aspect of the game. On average 50 percent of the players strongly agreed that the collaboration process and conflicts were well managed, the game focused on collective interests and the negotiations between the riparian states were successful. An assessment of the overall satisfaction was positive (Fig. 4 b).

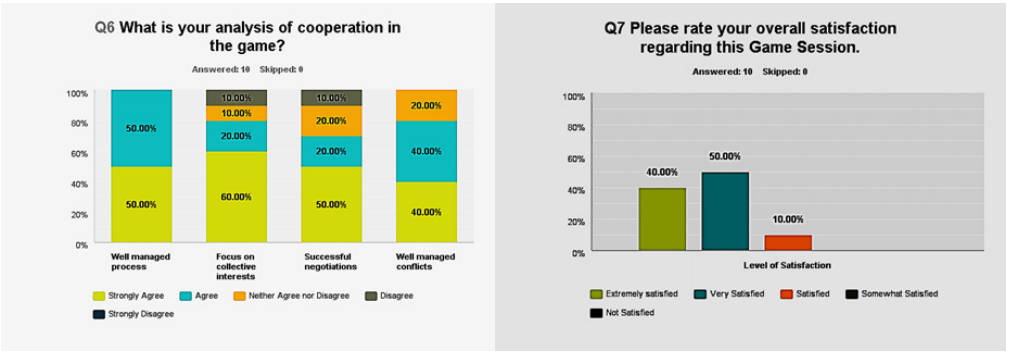


Fig. 4. (a) assessment of cooperation in the game; (b) overall satisfaction in the game.

### *4.3. Gaming as an Instrument for Enhancing Strategic Foresight*

WeShareIt was designed to simulate three real life situations that policy makers face. First, the information given in the game was not sufficient to support decision-making. Second, the decision makers had to make quick decisions in a centralized location far from the local context where the impacts of the decisions will be felt. Therefore to a large extent they did not have sufficient data and information to support their decision making process. Third, the policy makers were subjected to heightened stress which forced them to make quick decisions to enable them to move to the next round. Round four heightened the stress even further because all the countries could not meet the food and energy needs of their countries as the water allocation shrunk by 50 percent. The game simulated the day to day policy making environment so that the policy makers could possibly recognize the negative patterns that they have bolstered over the years and also feel free to practice new solutions, in a safe and controlled environment.

Based on our assessments, we derived four contributions of the WeShareIt game as an instrument for enhancing strategic foresight on disaster risk reduction. First, the game helped the players to get a big picture of the possible futures and the various pathways and strategies that could result into a disaster. In the first three rounds the country negotiations and strategies were focused on increasing energy production so as to meet the energy needs. The agreed strategy was for Ethiopia to generate more energy and trade with its partners. Everyone forgot that food is also an equally important sector. There was no country that suggested that South Sudan produces surplus food as a risk reduction strategy. South Sudan in the first two rounds requested that other countries purchase its food and there was a very poor response. So South Sudan resulted to converting its food squares to energy. In the fourth round none of the countries had sufficient food for their citizens and there was no contingency plan. This learning process was summed up by one of the participants, during the debriefing session as follows:

"As I was representing Ethiopia I thought my country had everything, because I always had surplus. So everything was okay, until the time when the rain failed and there was drought, I had no food. That is when I realized that we need to cooperate. I need these other countries. Cooperation is very important amongst us in our countries and even when we are working together in an institution [29]."

Second, the game helped the players to assess various plausible futures and not just one future. Sudan always had limited energy and in every round they had to negotiate and buy energy from other countries. From the start of the game we noticed that Sudan had developed a very interesting strategy for their energy deficit. They were using all their savings to buy solar power projects so that after a number of rounds they would be self-sufficient in terms of energy production. That was a very good strategy because Sudan is a very hot country and has an immense potential for solar power generation which has barely been tapped in real life. Solar power generation would buffer them from an energy crisis when the water levels are low and the dams cannot generate the required energy.

Third, the serious game was designed to assess resilience of the various countries. In the drought round all the countries were greatly affected. None could meet the basic food requirements of their populations and most were energy deficient. Through the

game one can assess whether these countries can bounce back to their original state after the drought. Unfortunately we did not have time to play more rounds after the drought round to assess the resilience aspect.

Lastly, the game was a test case for future policies on climate induced disasters and an audit of the current risk reduction practices. One of the participants stated that most of the lesson learnt he had read them in many books and journals and did not understand them well until he tested them in the game – then they were very clear. He states:

"This was a practical way of testing the benefit sharing concept … We are now able to have movement of goods between the countries. It was a very good tool to openly discuss and share benefits within the region. If only it was played by the members of the country themselves, it would have been more realistic and maybe more difficult. But I think many of us were able to fit into the shoes of another country. Simply because we understand the basin[29] ."

Finally, the game tested a number of planned policy actions because their real life adoption and application. Through the game, we realized that the risk reduction strategy of comparative advantage (meaning each country produces what it is best at and they trade with other countries) cannot be fully embraced by the Nile Basin countries because of a number of factors. One of them was trust. The players stated that they cannot trust their neighbours to be the sole producer of their energy or food. Therefore a more realistic policy intervention would be having mixed strategies that work together to build resilience and reduce risk. This will be addressed in more detail in our future work as explained in the concluding section, and further refinement of the WeShareIt game.

## 5. Concluding Remarks

We had argued at the beginning of this paper that strategic foresight is lacking in most of the Nile Basin decision making processes. In addition, we argued that the Nile Basin decision makers rarely take account of disaster risk reduction in the quick decision making processes. Thereafter, we explained why decision support tools might not be effective in combating future disasters. To complement these decision support tools, we further argued that individual and institutional learning on strategic foresight is essential. Based on our analysis, serious gaming was selected as the best tool, to facilitate the learning process.

The findings we have presented suggest that serious gaming holds a promise in enhancing strategic foresight in disaster risk reduction. Our findings are important in supporting river basin organisations to address complex challenges through a new way of decision support. The results are important for scientists in the relevant fields, capacity developers, water resources managers and the decision makers. To date, there has been too much emphasis, in many river basins, on quantitative tools that help predict the deeply uncertain future. This study does not offer a solution to the quest for more clarity, but rather provides a new way of addressing the challenge through capacity development. Our study also raises important questions about how we should design games for policy makers and river basin organisations. The challenge of trust needs to be taken into account so as to ensure that simulated games improve the trust building process as well as take into account the current realities. As a result of conducting this research, we propose more emphasis on serious gaming to support learning and organisational change. As suggested by the players, it would be fruitful to apply the game with all the Nile Basin countries, in order to deepen the learning process and improve the game further.

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