THE WATER SECURITY GAME – CAMBODIA

Each player, which may be an individual or team, represents a small community in rural Cambodia. Players must make decisions on water and land uses that balance community well-being and watershed environmental sustainability. These decisions determine overall resilience as well as the gains and losses of income (cash tokens) and water resources (water tokens). The player with the most cash and water tokens after four rounds wins the game.

KEY CONCEPTS

<table>
<thead>
<tr>
<th>Cash Tokens</th>
<th>Water Tokens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Represent money.</td>
<td>Represent water security.</td>
</tr>
</tbody>
</table>

LAND USE CARDS

Represent seven land uses, with unique impacts on cash and water tokens.

- Agriculture Rainfed
- Agriculture Commercially Irrigated
- Climate Smart Agriculture
- Agroforestry
- Protected Forest
- Irrigated Tree Plantation

WATER SECURITY ACTIVITY CARDS

Represent five water security activities, with unique impacts on cash tokens, water tokens, and resilience points (for flood, drought, and water-borne disease).

- Sanitation
- Water Storage
- Community Water Point
- Flood Protection
- Green Infrastructure

DISASTER DICE

Determines which disaster (flood, drought, or water-borne disease) affects players.

- Water-Borne Disease
- Drought
- Flood

COMMUNITY CHANCE CARDS

Represent environmental, political, social, or other events with unique impacts on cash and water tokens.

WATERSHED CHANCE CARDS

Represent environmental, political, social, or other events that have positive or negative impacts on cash and water tokens, exchanged between players.

RIVER BASIN CARDS

Represent each player’s downstream or upstream location.
INSTRUCTIONS

1. **River basin card:** Players draw river basin cards to determine who is “upstream” or “downstream,” which remains constant throughout the game.

2. **Initial cash token distribution:** In Round 1, moderator(s) distribute 10 cash tokens to each player. After Round 1, players start with the cash tokens held at the end of the previous round.

3. **Water budget:** Moderator(s) distribute water tokens to each player, representing water from rivers, rain, groundwater, or other sources. The number of tokens distributed each round decreases to represent potential impacts of climate change and declining water availability:

<table>
<thead>
<tr>
<th>ROUND 1</th>
<th>ROUND 2</th>
<th>ROUND 3</th>
<th>ROUND 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>18</td>
<td>16</td>
<td>14</td>
</tr>
</tbody>
</table>

4. **Land uses:** In Round 1, all players start with an assigned set of four Land Use cards, which the moderator(s) distributes. After Round 1, players may purchase land uses using their cash tokens to replace current ones.

5. **Land use earnings and deductions:** Based on each player’s selected land uses, the moderator(s) hand out cash tokens generated and water tokens either generated or required by land uses.

6. **Community livelihood costs:** Players must pay community livelihood costs in cash tokens to the moderator(s) to cover basic costs (education, food, health, etc.) each round. These costs increase each round to represent increasing demand and population growth:

<table>
<thead>
<tr>
<th>ROUND 1</th>
<th>ROUND 2</th>
<th>ROUND 3</th>
<th>ROUND 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
</tr>
</tbody>
</table>

7. **Community water needs:** The moderator(s) collect water tokens for community water needs to cover basic water needs (drinking, sanitation, cooking, etc.). These needs increase each round to represent increasing demand and population growth:

<table>
<thead>
<tr>
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<th>ROUND 3</th>
<th>ROUND 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

8. **Water security activities:** Players choose whether to invest in water security activities to avoid potential disaster impacts (see below). Moderator(s) collect cash tokens for the cost of any purchased water security activities and distribute water tokens gained from existing water security activities.

9. **Disaster:** Each round, the moderator rolls the disaster dice to determine which disaster will impact players. Players can avoid the disaster impacts with accrued resilience points from their water security activity cards. Resilience points needed to avoid disasters increase each round to represent the growing impacts of climate change, as do negative impacts on water and cash tokens.

<table>
<thead>
<tr>
<th>ROUND 1</th>
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<th>ROUND 4</th>
</tr>
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<tbody>
<tr>
<td>+3</td>
<td>+4</td>
<td>+5</td>
<td>+6</td>
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</table>

<table>
<thead>
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<th>ROUND 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>-3</td>
<td>-4</td>
<td>-5</td>
<td>-6</td>
</tr>
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</table>

10. **Community chance cards:** Each player draws a community chance card. Moderator(s) collect or distribute tokens accordingly.

11. **Watershed chance card:** Moderator(s) draw one watershed chance card which applies to all players. Player(s) exchange tokens accordingly, based on their upstream or downstream position.

12. **Balancing water and cash:** Water and cash tokens are balanced at the end of each round. For every “negative” water or cash token (e.g. a player could not pay water needs, livelihood costs, or chance cards), two cash or water tokens must be paid respectively. The moderator(s) collect tokens accordingly. If a player does not have enough tokens to pay to meet the minimum allowable amounts of 0 water and 0 cash tokens, they may not proceed to the next round.

13. **Round summary:** The moderator(s) note water and cash token totals. Players carry land uses, water security activities, and income over to following rounds but must put water tokens aside.

14. **Number of rounds:** Play for 4 rounds total. Repeat steps 2-12.

15. **End of game.** The moderator(s) debriefs players on round outcomes and discusses impact of land use choices, chance cards, and disasters. The moderator(s) facilitate a discussion about how the game was ‘won and lost’ and how the game applies to communities.
UPSTREAM RIVER BASIN CARD

DOWNSTREAM RIVER BASIN CARD

UPSTREAM

DOWNSTREAM
AGRICULTURE RAINFED

CASH TOKENS
- ONE-TIME COST
  -2
  to switch to this land use
- ANNUAL CASH GAIN
  +3
  generated by this land use

WATER TOKENS
- IMPACTS FAR FROM RIVER
  -4
- IMPACTS CLOSE TO RIVER
  -7
AGRICULTURE COMMERCIALLY IRRIGATED

CASH TOKENS

ONE-TIME COST
-7

to switch to this land use

ANNUAL CASH GAIN
+10

generated by this land use

WATER TOKENS

IMPACTS FAR FROM RIVER
-8

IMPACTS CLOSE TO RIVER
-10
CLIMATE SMART AGRICULTURE

CASH TOKENS
- ONE-TIME COST: -2
- ANNUAL CASH GAIN: +5
  to switch to this land use
  generated by this land use

WATER TOKENS
- IMPACTS FAR FROM RIVER: -2
- IMPACTS CLOSE TO RIVER: -4

IMPACTS FAR FROM RIVER
IMPACTS CLOSE TO RIVER
AGROFORESTRY

CASH TOKENS

ONE-TIME COST
-3

to switch to this land use

ANNUAL CASH GAIN
+4

generated by this land use

WATER TOKENS

IMPACTS FAR FROM RIVER
0

IMPACTS CLOSE TO RIVER
-1
PROTECTED FOREST

CASH TOKENS
ONE-TIME COST
0 to switch to this land use

ANNUAL CASH GAIN
+1 round of purchase
+2 subsequent rounds

WATER TOKENS
IMPACTS FAR FROM RIVER
+2 round of purchase
+3 subsequent rounds

IMPACTS CLOSE TO RIVER
+3 round of purchase
+4 subsequent rounds
IRRIGATED TREE PLANTATION

CASH TOKENS
ONE-TIME COST
-3 to switch to this land use

ANNUAL CASH GAIN
+5 round of purchase
+6 subsequent rounds

WATER TOKENS
IMPACTS FAR FROM RIVER
-2 round of purchase
-3 subsequent rounds

IMPACTS CLOSE TO RIVER
-3 round of purchase
-4 subsequent rounds
SANITATION
[e.g. latrines, improved treatment]

Number of infrastructure type available for purchase: Unlimited

- CASH TOKENS
  -7 capital cost

- WATER TOKENS
  +4 benefit

- RESILIENCE POINTS
  - Disease: 3
  - Drought: 1
  - Flood: 2
WATER STORAGE
[ e.g. trough, rain barrels, ponds, reservoirs ]

-4

Number of infrastructure type available for purchase: Unlimited
COMMUNITY WATER POINT
[ surface water intake, groundwater wells ]

CASH TOKENS
-5

WATER TOKENS
+4

RESILIENCE POINTS
- Disease: 2
- Drought: 3
- Flood: 1

Number of infrastructure type available for purchase: 1 per round, max of 3
FLOOD PROTECTION
[drainage, berms, flood walls]

- Number of infrastructure type available for purchase: 1 per round

<table>
<thead>
<tr>
<th>CASH TOKENS</th>
<th>WATER TOKENS</th>
<th>RESILIENCE POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>-6 capital cost</td>
<td>+3 benefit</td>
<td>Disease: 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drought: 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flood: 3</td>
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GREEN INFRASTRUCTURE
[ vegetative cover for source water protection, natural buffers, grassed waterways, stream and coastal buffers ]

Number of infrastructure type available for purchase: Unlimited

CASH TOKENS
-3 capital cost

WATER TOKENS
+2 benefit

RESILIENCE POINTS
- Disease: 1
- Drought: 2
- Flood: 3
COMMUNITY CHANCE

The cost of fertilizer has increased: -1 cash for each land use plot except climate smart agriculture and forests.

COMMUNITY CHANCE

Overuse of fertilizers has led increased runoff and contamination of your river water, -3 water unless you have green infrastructure, which offers source water protection and limits damage to -1 water.

COMMUNITY CHANCE

Your community received a loan to build water storage, leading to less water stress during the dry season, improved health, and more water availability, gain 1 water storage infrastructure with benefits the next round.

COMMUNITY CHANCE

The prime minister orders that only one rice cycle can be grown per year due to drought, but neighbors do not listen and grow two cycles, leading to reduced water availability. -3 water if your neighbor to your right has any irrigated land uses.
COMMUNITY CHANCE

Brown planthopper swarms occur and everyone in your community loses their crop, -3 cash, -2 water.

COMMUNITY CHANCE

Ecotourism operators are drawn to your community due to protected forests. +3 cash if you have any forest land use cards.

COMMUNITY CHANCE

Your community has invested in stream buffers to prevent agrochemicals leaching into canals and streams. As a result, waterways have more fish, riverbanks are sturdier, and it is safe to fish. This increases livelihoods and discourages livestock from approaching the river, +3 cash and +2 water.

COMMUNITY CHANCE

In a bumper year for cashew nuts, prices have increased. If you have a tree plantation, +4 cash.
COMMUNITY CHANCE

This year, there is increased competition for water between communities in the region, negatively impacting economic growth and reducing water availability, unless you have a community water point or water storage, -3 cash, -2 water.

-3  -2

COMMUNITY CHANCE

A global pandemic reduces export demand, reduces migration of agricultural workers able to help with cultivation, and hurts local economies, -4 cash for impacts on livelihoods.

-4

COMMUNITY CHANCE

There is a watershed-wide behavior change communications campaign to promote safe sanitation and good water management practices. As a result, more people begin adopting better WASH practices, +2 water.

+2

COMMUNITY CHANCE

You have invested in better agricultural equipment, including improved irrigation, cultivation, and storage equipment to increase yields and minimize rice losses, +3 cash, +2 water if you have any agricultural plot.

+3  +2
COMMUNITY CHANCE

A country REDD+ strategy is implemented, rewarding avoided deforestation and degradation in local communities with funding from international sources. If you have any protected forested land uses +3 cash, or if you have no protected forests, but have any plantation land use, +2 cash.

-2 water

COMMUNITY CHANCE

Due to imminent threats of changing weather patterns, if you have any rainfed agriculture you are under higher risk of both severe droughts and floods and therefore have greater chances of losing your crop, -2 water, -2 cash.

COMMUNITY CHANCE

A local well tested positive for unsafe levels of arsenic, posing threats to human health and therefore making the drinking water unusable. Safe local water availability decreases, -3 water.

COMMUNITY CHANCE

A fish farm is established on your land, increasing your income but impacting nearby water quality, +3 cash, and -1 water.

+3 water

COMMUNITY CHANCE

A country REDD+ strategy is implemented, rewarding avoided deforestation and degradation in local communities with funding from international sources. If you have any protected forested land uses +3 cash, or if you have no protected forests, but have any plantation land use, +2 cash.
WATERSHED CHANCE

Payment for Environmental Services is introduced in the watershed by the Ministry of the Environment, improving coordination between upstream and downstream communities. If the upstream player has any forests, each downstream player pays the upstream player 1 cash, and the upstream player gives 1 water to each downstream player.

WATERSHED CHANCE

A major irrigation project is implemented in upstream communities, leading to water abstraction and less river flow downstream. If the upstream player has any irrigated agriculture or tree plantation land use cards, each downstream player must give the upstream player 2 water.

WATERSHED CHANCE

Discussions between upstream and downstream communities mitigate water rights disputes and lead to more equitable water distribution. The upstream player gives downstream players 1 water each.

WATERSHED CHANCE

An Economic Land Concession (ELC) is granted to an upstream community to develop industrial agriculture on previously forested land, increasing water pollution and abstraction. Unless the downstream player has green infrastructure, they must each give 2 water to each upstream player.
WATERSHED CHANCE

A dam is constructed upstream of the watershed, resulting in overexploitation, leading to reduced erosion and improved water quality in exchange for payment from downstream communities. Each downstream player must give the upstream player 2 water to each downstream player.
WATERSHED CHANCE

Over-extraction of water upstream leads to conflict between upstream and downstream communities, with protests in the area shutting off roads key for value chains. The upstream player must give 1 cash to each downstream player.
<table>
<thead>
<tr>
<th>Water Tokens</th>
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<tbody>
<tr>
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</table>
Money Tokens

please cut along dotted lines
AGRICULTURE

RAINFED

CASH TOKENS
ONE-TIME COST
-2

to switch to this land use

ANNUAL CASH GAIN
+3

generated by this land use

WATER TOKENS
IMPACTS FAR FROM RIVER
-4

IMPACTS CLOSE TO RIVER
-7

IMPACTS FAR FROM RIVER
IMPACTS CLOSE TO RIVER

ONE-TIME COST
-7

to switch to this land use

ANNUAL CASH GAIN
+10

generated by this land use

AGRICULTURE
COMMERCIALLY IRRIGATED

CASH TOKENS
ONE-TIME COST
-7

to switch to this land use

ANNUAL CASH GAIN
+10

generated by this land use

WATER TOKENS
IMPACTS FAR FROM RIVER
-8

IMPACTS CLOSE TO RIVER
-10

IMPACTS FAR FROM RIVER
IMPACTS CLOSE TO RIVER

ONE-TIME COST
-8

to switch to this land use

ANNUAL CASH GAIN
+10

generated by this land use

CLIMATE SMART
AGRICULTURE

CASH TOKENS
ONE-TIME COST
-2

to switch to this land use

ANNUAL CASH GAIN
+5

generated by this land use

WATER TOKENS
IMPACTS FAR FROM RIVER
-2

IMPACTS CLOSE TO RIVER
-4

IMPACTS FAR FROM RIVER
IMPACTS CLOSE TO RIVER

ONE-TIME COST
-3

to switch to this land use

ANNUAL CASH GAIN
+4

generated by this land use

AGROFORESTRY

CASH TOKENS
ONE-TIME COST
-3

to switch to this land use

ANNUAL CASH GAIN
+4

generated by this land use

WATER TOKENS
IMPACTS FAR FROM RIVER
0

IMPACTS CLOSE TO RIVER
-1

IMPACTS FAR FROM RIVER
IMPACTS CLOSE TO RIVER

ONE-TIME COST
-2

to switch to this land use

ANNUAL CASH GAIN
+5

generated by this land use
PROTECTED FOREST

CASH TOKENS

ONE-TIME COST
0

to switch to this land use

ANNUAL CASH GAIN
+1 +2

round of purchase subsequent rounds

WATER TOKENS

IMPACTS FAR FROM RIVER
+2 +3

round of purchase subsequent rounds

IMPACTS CLOSE TO RIVER
+4

round of purchase subsequent rounds

IRRIGATED TREE PLANTATION

CASH TOKENS

ONE-TIME COST
-3

to switch to this land use

ANNUAL CASH GAIN
+5 +6

round of purchase subsequent rounds

WATER TOKENS

IMPACTS FAR FROM RIVER
-2 -3

round of purchase subsequent rounds

IMPACTS CLOSE TO RIVER
-4

round of purchase subsequent rounds