

# Do probabilistic forecasts lead to better decisions? Try it yourself!

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2012. This game was prepared by Maria-Helena Ramos (IRSTEA), Schalk Jan van AnDEL (UNESCO-IHE), and Florian Pappenberger (ECMWF). If you use this game, the authors would be grateful for feedback on your usage and results so as to help improve future versions of the game and justify further development efforts.

Reference: Ramos, M.H., van AnDEL, S.J., Pappenberger, F., 2013: Do probabilistic forecasts lead to better decisions? *Hydrol. Earth Syst. Sci.*, 17, 2219-2232.

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This game is part of HEPEX activities: [www.hepex.org](http://www.hepex.org)

[START](#)

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General instructions: use full screen mode. Always click on the appropriate links in each slide.  
Do not use Page Up, Page Down or arrow keys for scrolling.

# Flood Protection Game: use your worksheet

Do probabilistic forecasts lead to better decisions?  
Try it yourself!

-- Game 1 --- Game 1 --

→ **GAME 1**

Case	Open the Gate?	Cost for Gate operation (open costs 2000)	Flooding occurred?	Damage (in case you did not open the gate and the flood occurred)	Your purse
Your Initial Purse					30 000
EXAMPLE 1	YES <input type="checkbox"/> X	-2000	YES <input type="checkbox"/> X	0	28 000
	NO <input type="checkbox"/>		NO <input type="checkbox"/>		
EXAMPLE 2	YES <input type="checkbox"/>	0	YES <input type="checkbox"/> X	-7000	21 000
	NO <input type="checkbox"/> X		NO <input type="checkbox"/>		
EXAMPLE 3	YES <input type="checkbox"/>	0	YES <input type="checkbox"/>	0	21 000
	NO <input type="checkbox"/> X		NO <input type="checkbox"/> X		
Your Initial Purse					30 000
ROUND 1	YES <input type="checkbox"/>		YES <input type="checkbox"/>		
	NO <input type="checkbox"/>		NO <input type="checkbox"/>		
ROUND 2	YES <input type="checkbox"/>		YES <input type="checkbox"/>		
	NO <input type="checkbox"/>		NO <input type="checkbox"/>		
ROUND 3	YES <input type="checkbox"/>		YES <input type="checkbox"/>		
	NO <input type="checkbox"/>		NO <input type="checkbox"/>		
ROUND 4	YES <input type="checkbox"/>		YES <input type="checkbox"/>		
	NO <input type="checkbox"/>		NO <input type="checkbox"/>		
ROUND 5	YES <input type="checkbox"/>		YES <input type="checkbox"/>		
	NO <input type="checkbox"/>		NO <input type="checkbox"/>		
ROUND 6	YES <input type="checkbox"/>		YES <input type="checkbox"/>		
	NO <input type="checkbox"/>		NO <input type="checkbox"/>		

} **Examples**

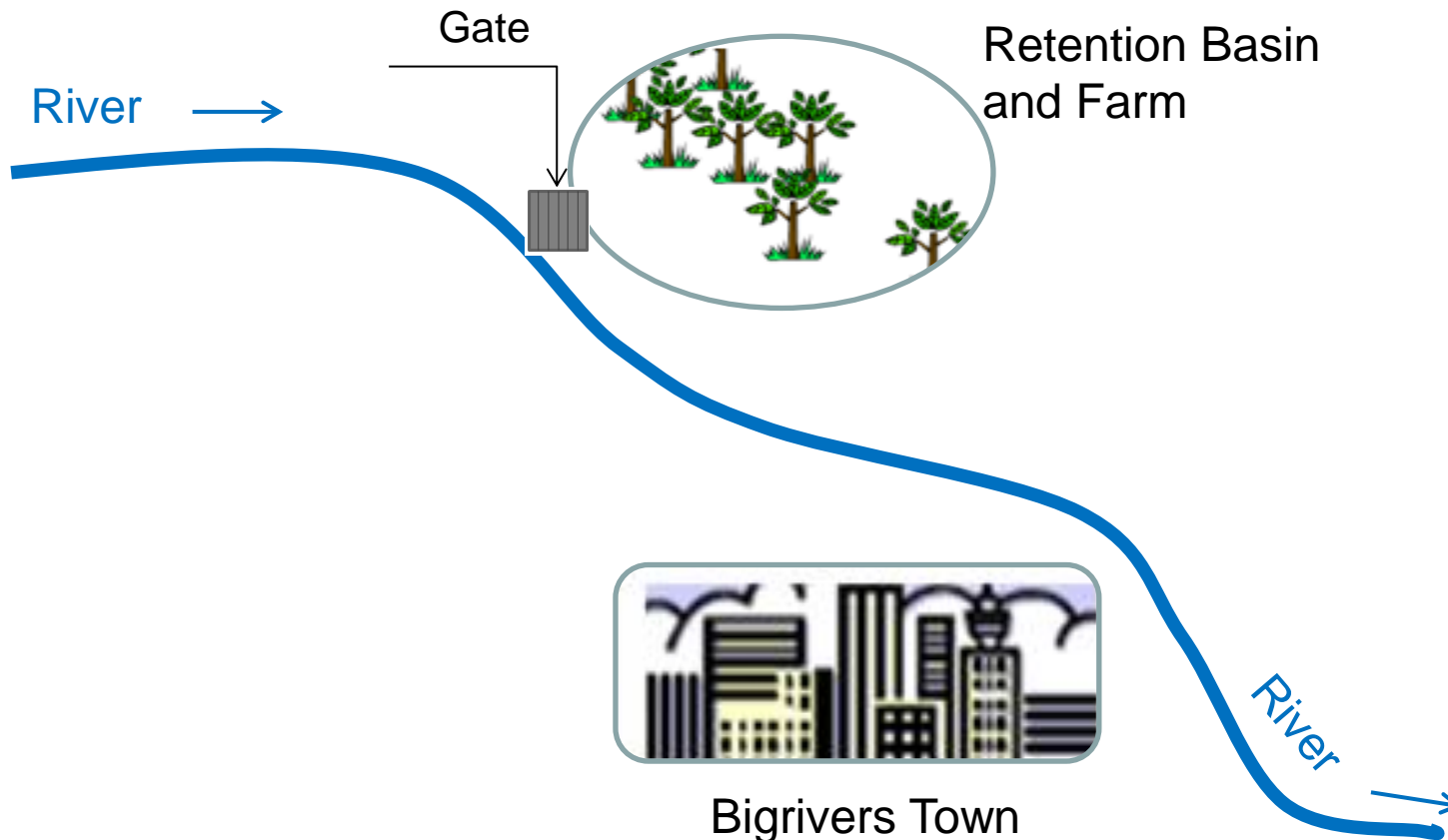
→ **Start marking here!**

**Return your forms  
at the end!**

[NEXT](#)

# Flood Protection Game Instructions

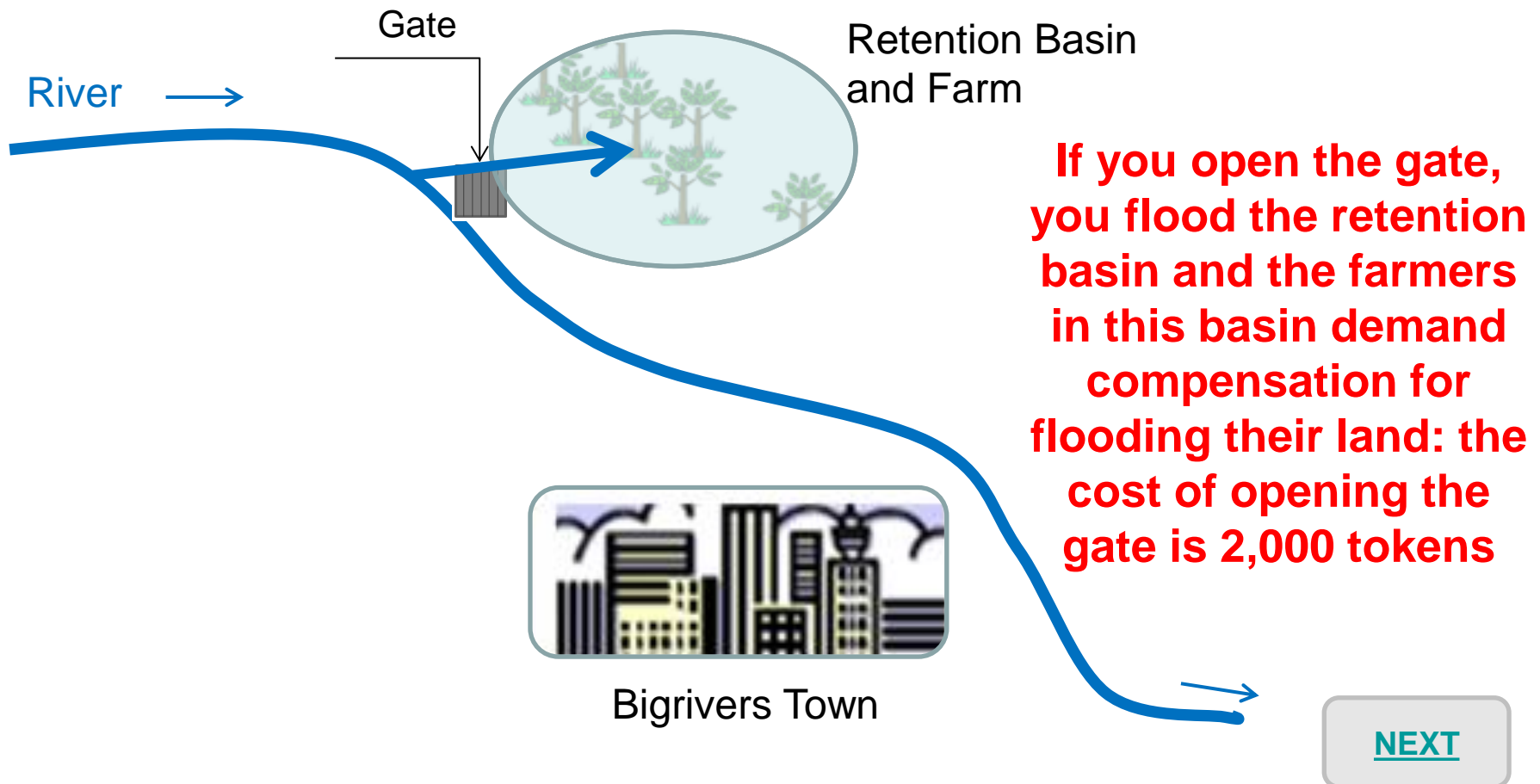
Your company has received 30,000 tokens for a flood protection contract. You have to manage a gate which is the inlet of a retention basin designed to protect the town of Bigrivers.



[NEXT](#)

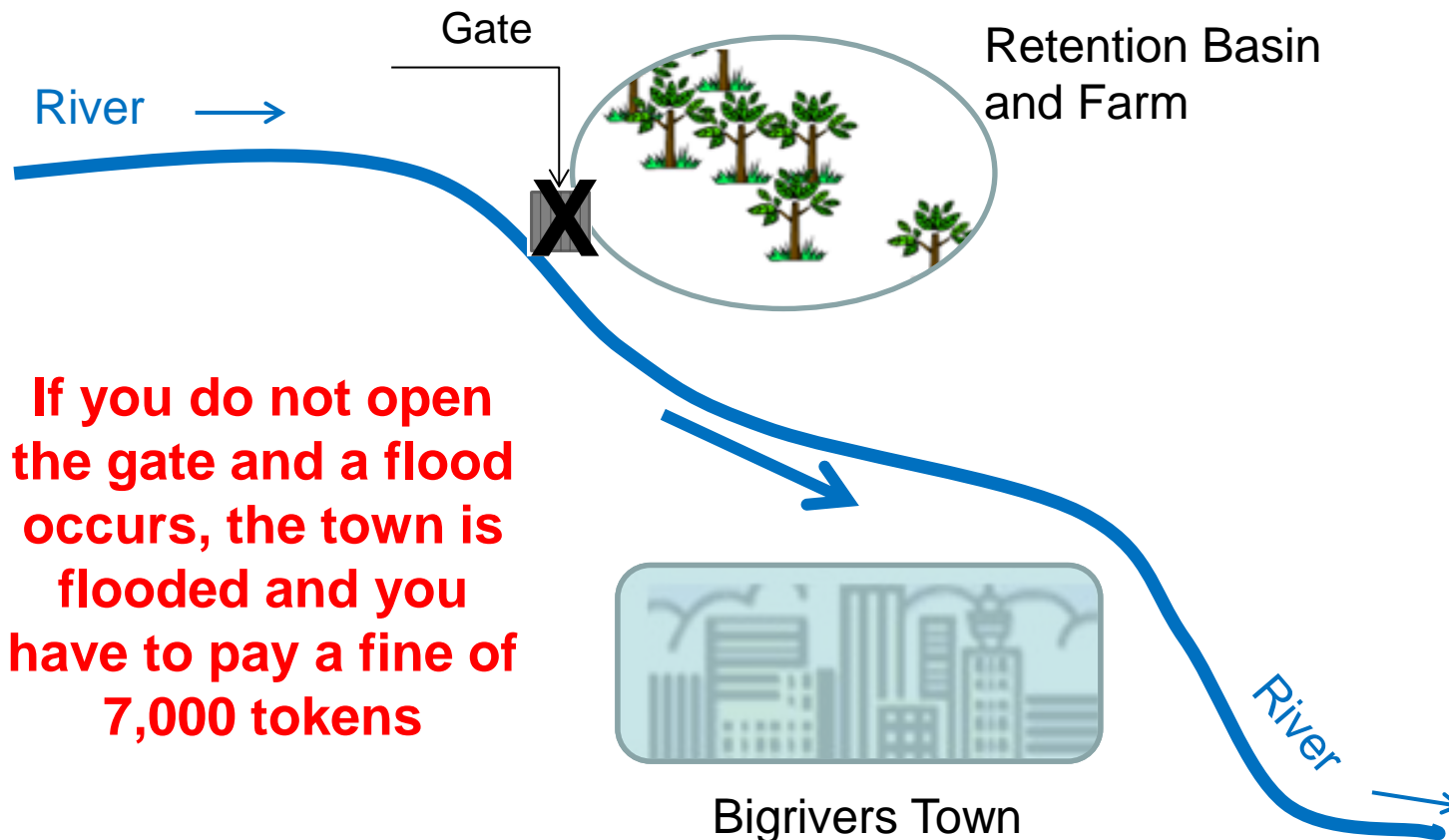
# Flood Protection Game Instructions

Your company has received 30,000 tokens for a flood protection contract. You have to manage a gate which is the inlet of a retention basin designed to protect the town of Bigrivers.



# Flood Protection Game Instructions

Your company has received 30,000 tokens for a flood protection contract. You have to manage a gate which is the inlet of a retention basin designed to protect the town of Bigrivers.

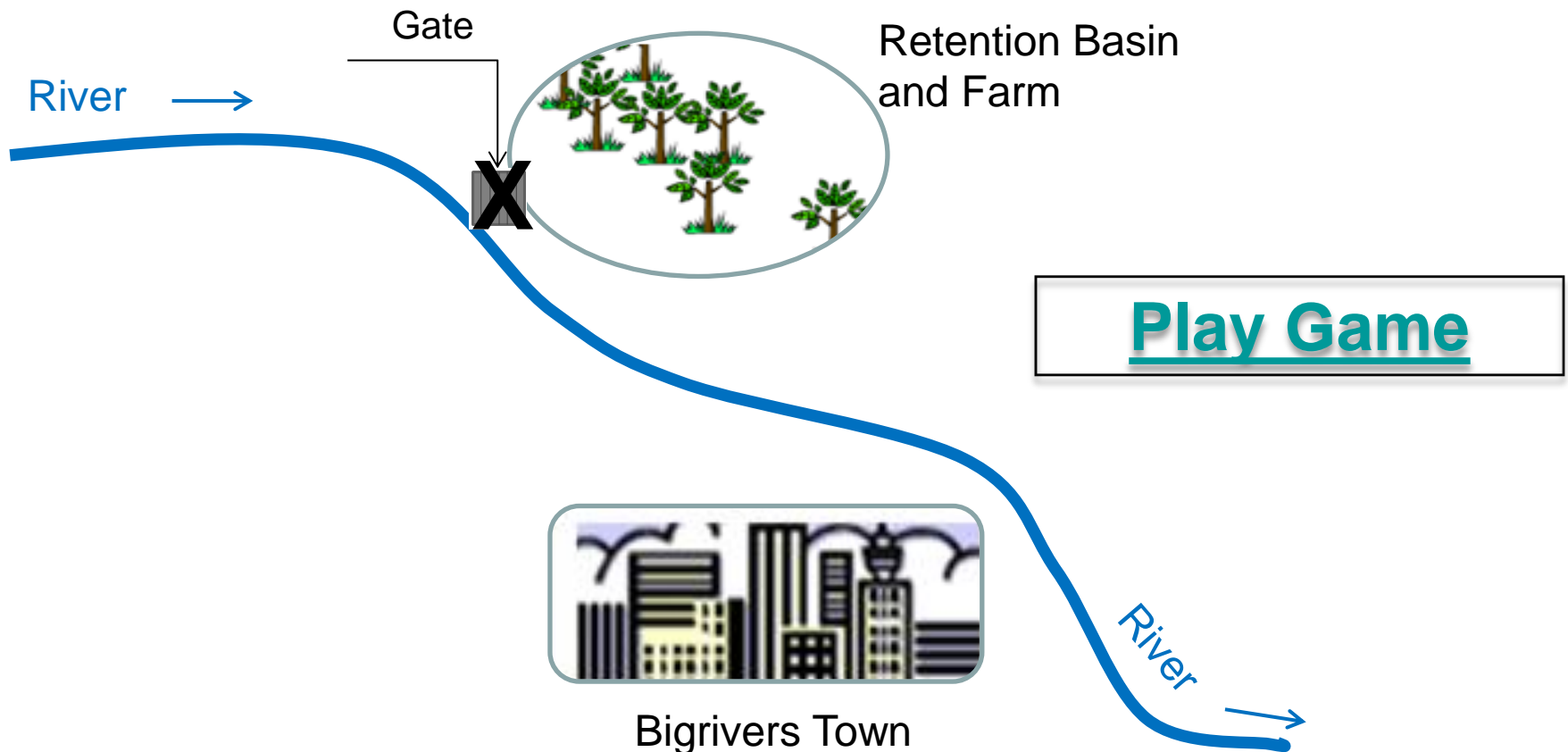


**If you do not open the gate and a flood occurs, the town is flooded and you have to pay a fine of 7,000 tokens**

[NEXT](#)

# Flood Protection Game Instructions

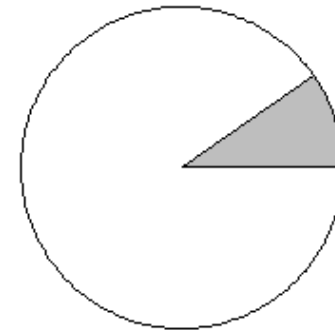
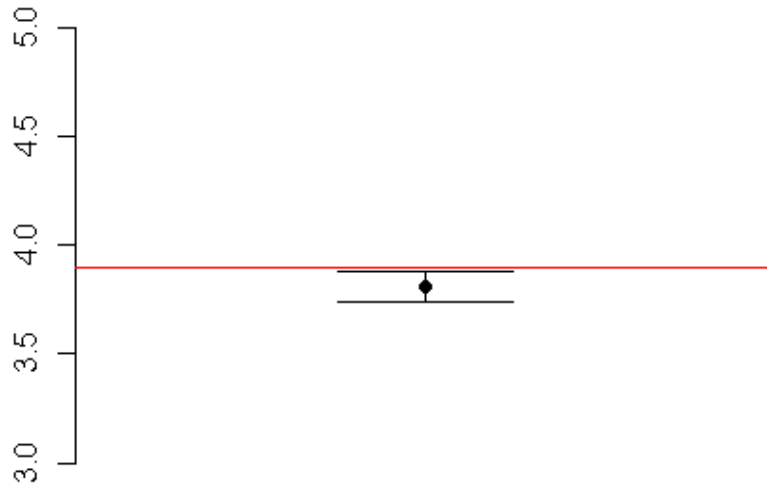
You will be presented with a forecast of the river water level.  
The error on the forecast changes from day to day but is on average 0.2m.  
You have to decide whether to open the gate or not.



# Round 1

Expected output: 3.81 metres  $\pm$  0.07

Probability of flooding: 9.74 %



- Flooding: water level  $>$  3.9 metres
- Penalty for not opening the gate when flooding: 7000 tokens
- Cost of opening the gate: 2000 tokens
- Average error of the forecast system: 0.2 metres

**Do you want to open the gate to the retention basin?**

Yes

No

## Round 1 results

It did not flood.

But you decided to open the gate.

You have to pay the farmers: 2000 tokens.

OK



## Round 1 results

It did not flood.

You did not open the gate.

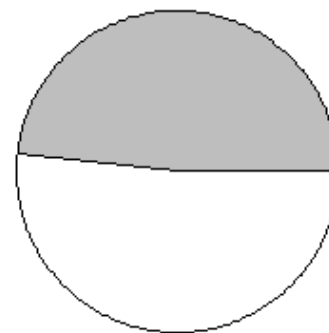
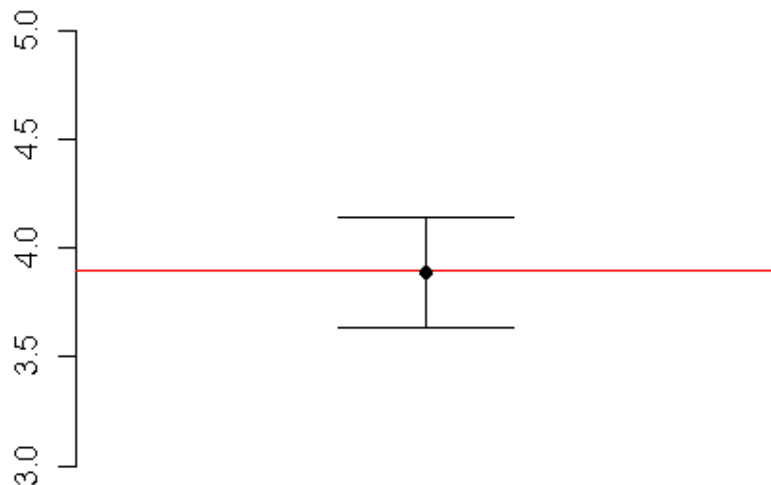
You do not have to pay anything.

OK

## Round 2

Expected output: 3.89 metres  $\pm$  0.25

Probability of flooding: 48.27 %



- Flooding: water level  $>$  3.9 metres
- Penalty for not opening the gate when flooding: 7000 tokens
- Cost of opening the gate: 2000 tokens
- Average error of the forecast system: 0.2 metres

**Do you want to open the gate to the retention basin?**

Yes

No

## Round 2 results

It did not flood.

But you decided to open the gate.

You have to pay the farmers: 2000 tokens.

OK

## Round 2 results

It did not flood.

You did not open the gate.

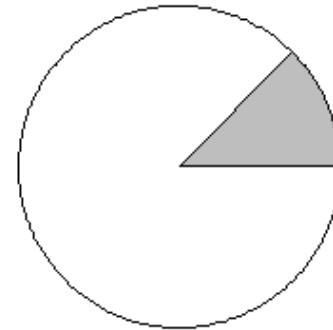
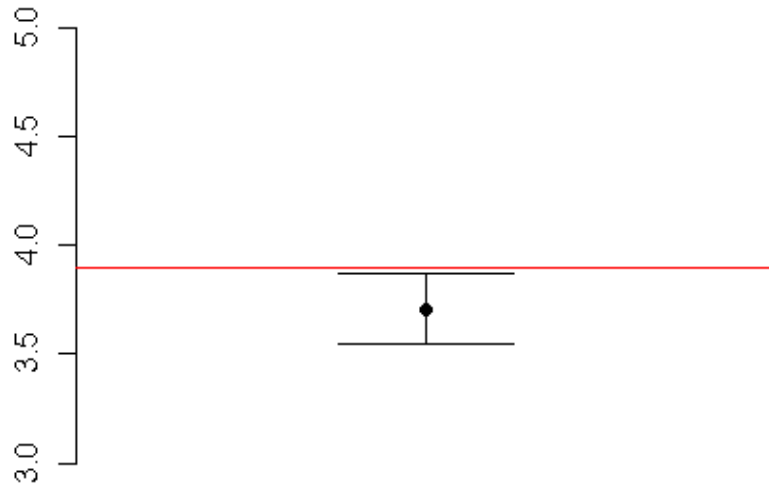
You do not have to pay anything.

OK

## Round 3

Expected output: 3.71 metres +/- 0.16

Probability of flooding: 12.53 %



- Flooding: water level > 3.9 metres
- Penalty for not opening the gate when flooding: 7000 tokens
- Cost of opening the gate: 2000 tokens
- Average error of the forecast system: 0.2 metres

**Do you want to open the gate to the retention basin?**

Yes

No

### Round 3 results

It did not flood.

But you decided to open the gate.

You have to pay the farmers: 2000 tokens.

OK

### Round 3 results

It did not flood.

You did not open the gate.

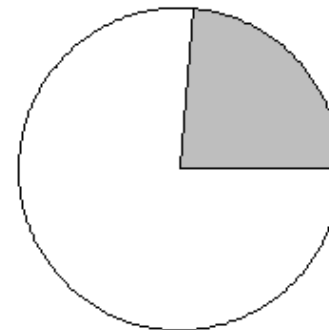
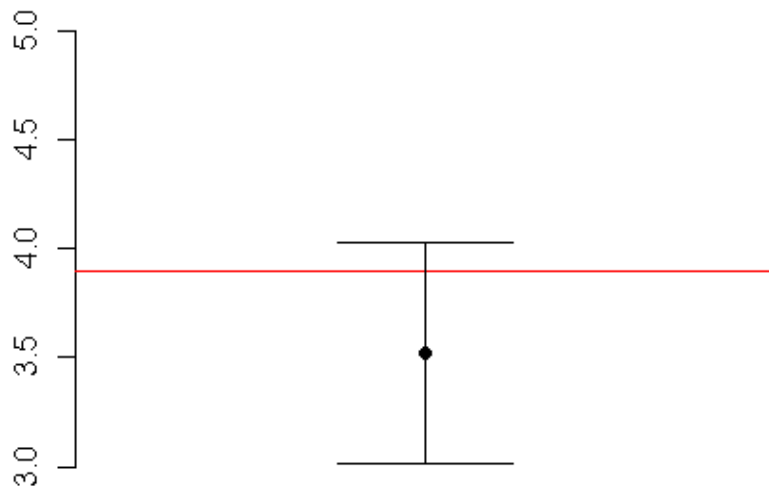
You do not have to pay anything.

OK

## Round 4

Expected output: 3.52 metres +/- 0.51

Probability of flooding: 23.59 %



- Flooding: water level > 3.9 metres
- Penalty for not opening the gate when flooding: 7000 tokens
- Cost of opening the gate: 2000 tokens
- Average error of the forecast system: 0.2 metres

**Do you want to open the gate to the retention basin?**

Yes

No



## Round 4 results

It did not flood.

But you decided to open the gate.

You have to pay the farmers: 2000 tokens.

OK

## Round 4 results

It did not flood.

You did not open the gate.

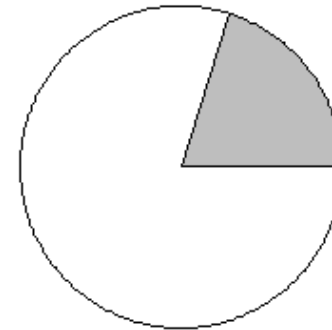
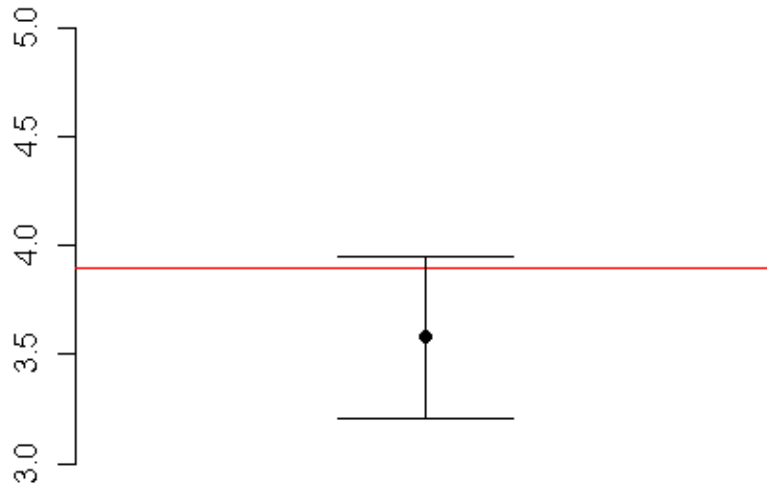
You do not have to pay anything.

OK

# Round 5

Expected output: 3.58 metres +/- 0.37

Probability of flooding: 20.1 %



- Flooding: water level > 3.9 metres
- Penalty for not opening the gate when flooding: 7000 tokens
- Cost of opening the gate: 2000 tokens
- Average error of the forecast system: 0.2 metres

**Do you want to open the gate to the retention basin?**

Yes

No

## Round 5 results

A flood came.

You decided to open the gate.

You protected the town, but you have to pay the farmers: 2000 tokens.

OK

## Round 5 results

A flood came.

But you did not open the gate.

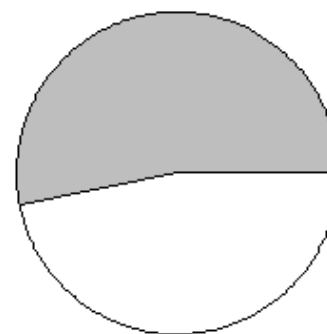
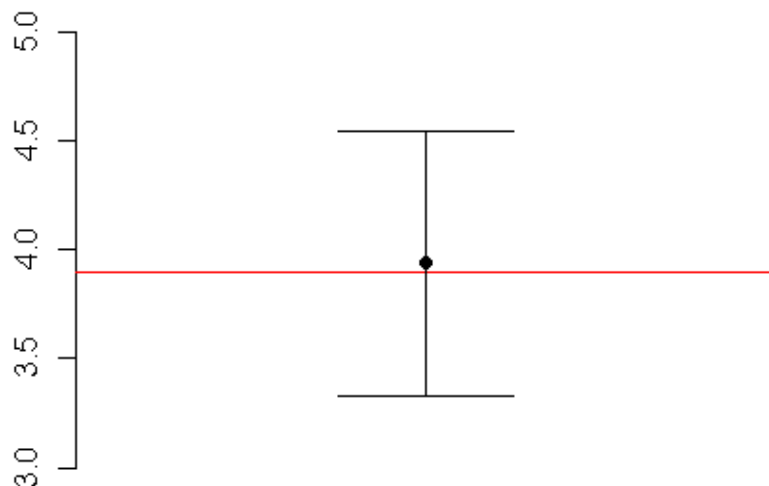
The town was flooded. You have to pay: 7000 tokens.

OK

## Round 6

Expected output: 3.94 metres  $\pm$  0.61

Probability of flooding: 53.17 %



- Flooding: water level  $>$  3.9 metres
- Penalty for not opening the gate when flooding: 7000 tokens
- Cost of opening the gate: 2000 tokens
- Average error of the forecast system: 0.2 metres

**Do you want to open the gate to the retention basin?**

Yes

No

## Round 6 results

A flood came.

You decided to open the gate.

You protected the town, but you have to pay the farmers: 2000 tokens.

OK

## Round 6 results

A flood came.

But you did not open the gate.

The town was flooded. You have to pay: 7000 tokens.

OK



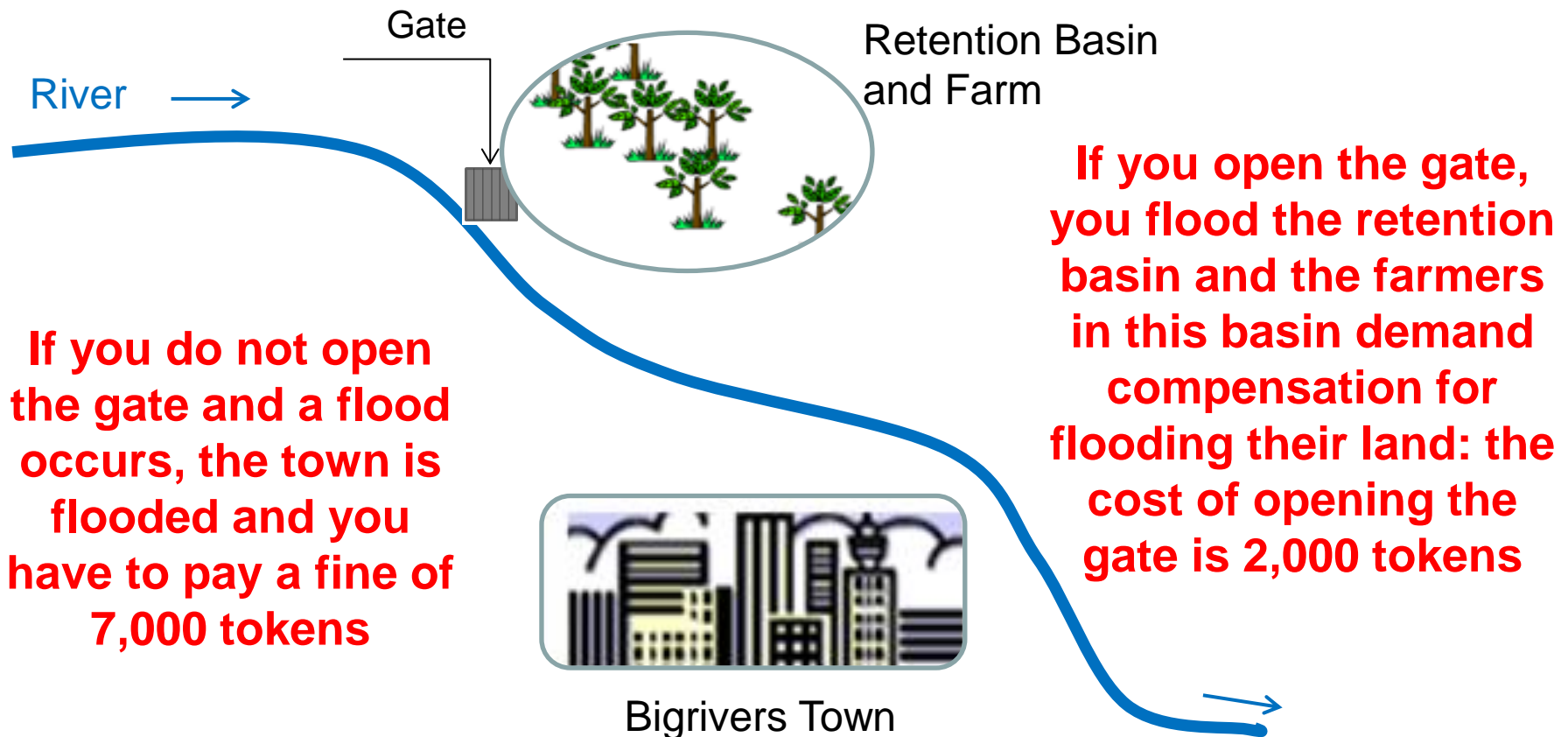
## END OF GAME 1

Your final purse is...

[Continue to Game 2](#)

# Flood Protection **Game 2: SAME RULES!**

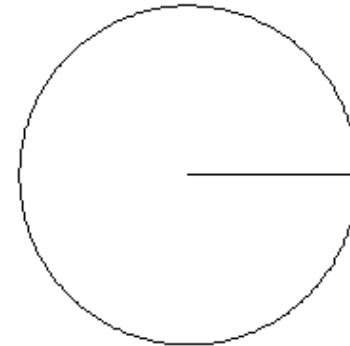
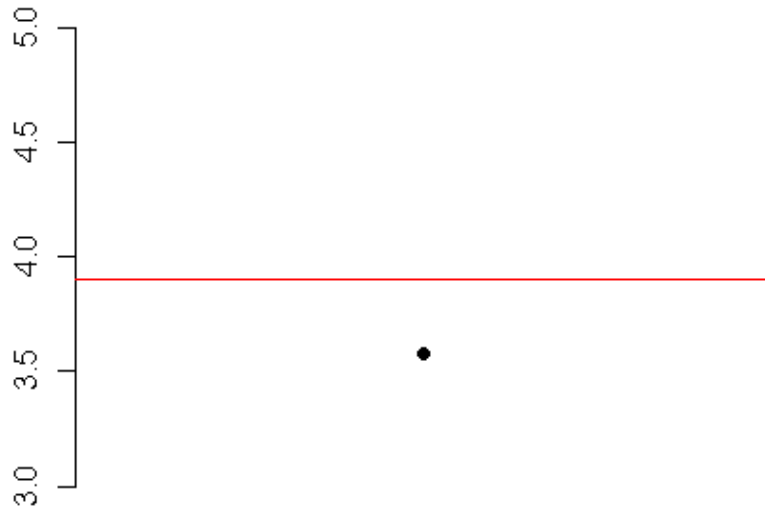
## Play Game 2



# Round 1

Expected output: 3.58 metres +/- N/A

Probability of flooding: N/A %



- Flooding: water level > 3.9 metres
- Penalty for not opening the gate when flooding: 7000 tokens
- Cost of opening the gate: 2000 tokens
- Average error of the forecast system: 0.2 metres

**Do you want to open the gate to the retention basin?**

Yes

No

## Round 1 results

A flood came.

You decided to open the gate.

You protected the town, but you have to pay the farmers: 2000 tokens.

OK

## Round 1 results

A flood came.

But you did not open the gate.

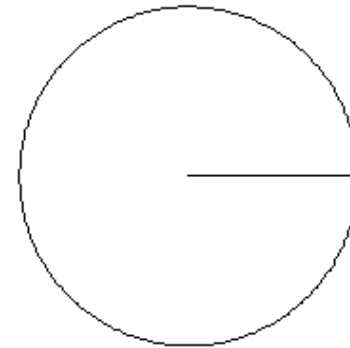
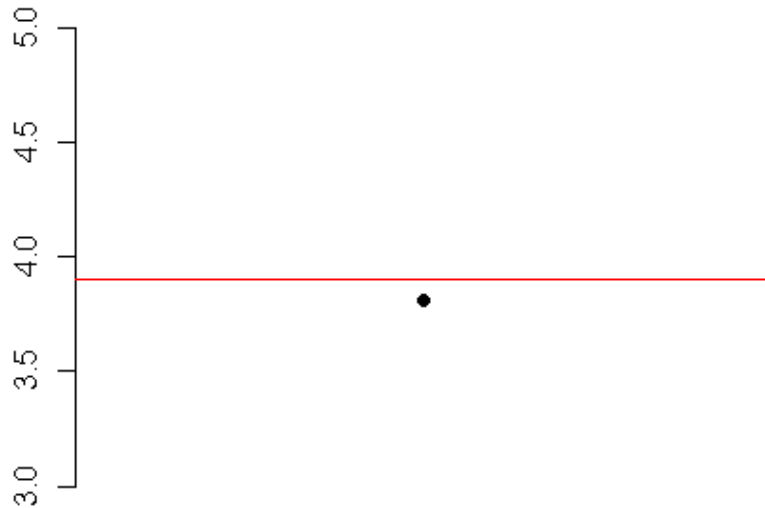
The town was flooded. You have to pay: 7000 tokens.

OK

## Round 2

Expected output: 3.81 metres +/- N/A

Probability of flooding: N/A %



- Flooding: water level > 3.9 metres
- Penalty for not opening the gate when flooding: 7000 tokens
- Cost of opening the gate: 2000 tokens
- Average error of the forecast system: 0.2 metres

**Do you want to open the gate to the retention basin?**

Yes

No

## Round 2 results

It did not flood.

But you decided to open the gate.

You have to pay the farmers: 2000 tokens.

OK

## Round 2 results

It did not flood.

You did not open the gate.

You do not have to pay anything.

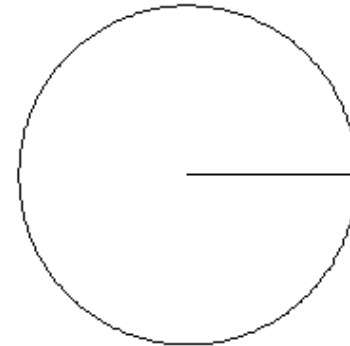
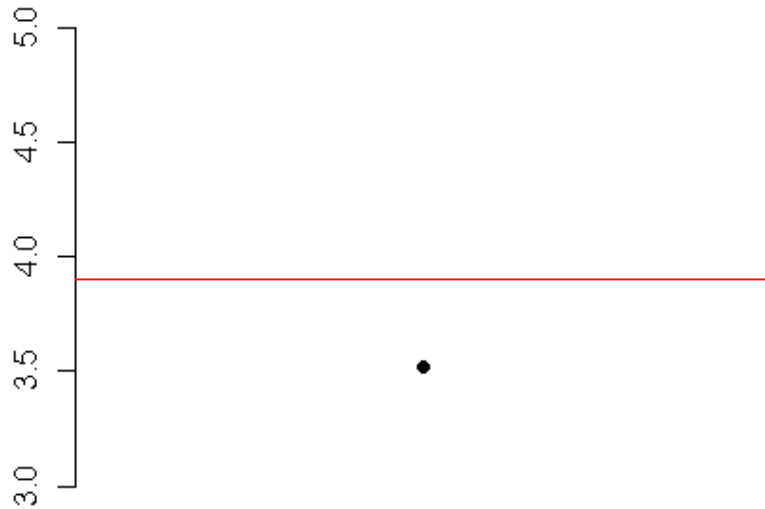
OK



## Round 3

Expected output: 3.52 metres +/- N/A

Probability of flooding: N/A %



- Flooding: water level > 3.9 metres
- Penalty for not opening the gate when flooding: 7000 tokens
- Cost of opening the gate: 2000 tokens
- Average error of the forecast system: 0.2 metres

**Do you want to open the gate to the retention basin?**

Yes

No

### Round 3 results

It did not flood.

But you decided to open the gate.

You have to pay the farmers: 2000 tokens.

OK

### Round 3 results

It did not flood.

You did not open the gate.

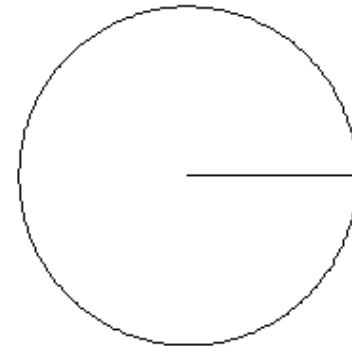
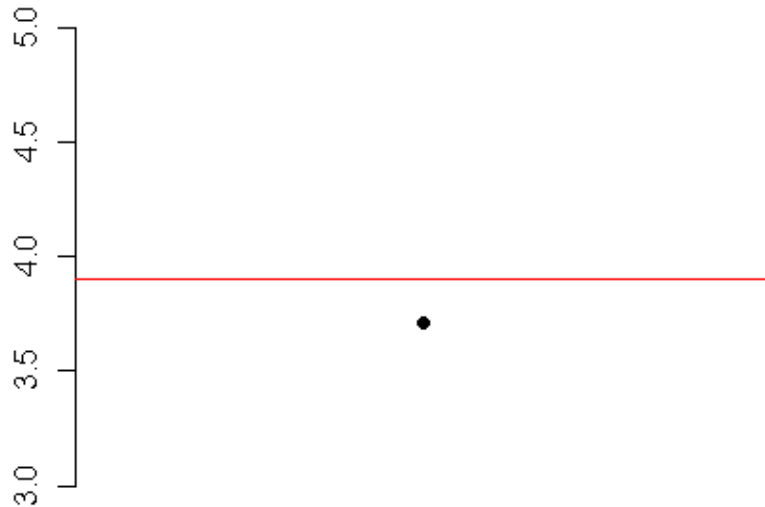
You do not have to pay anything.

OK

# Round 4

Expected output: 3.71 metres +/- N/A

Probability of flooding: N/A %



- Flooding: water level > 3.9 metres
- Penalty for not opening the gate when flooding: 7000 tokens
- Cost of opening the gate: 2000 tokens
- Average error of the forecast system: 0.2 metres

**Do you want to open the gate to the retention basin?**

Yes

No

## Round 4 results

It did not flood.

But you decided to open the gate.

You have to pay the farmers: 2000 tokens.

OK

## Round 4 results

It did not flood.

You did not open the gate.

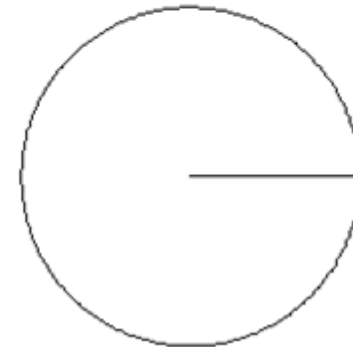
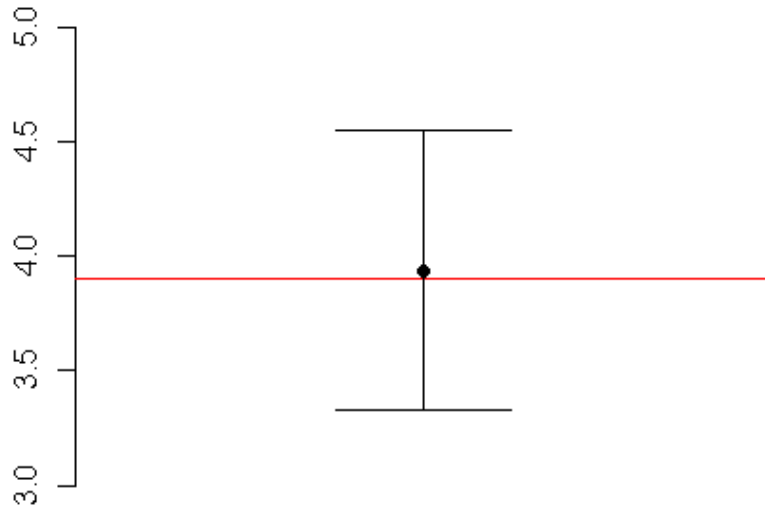
You do not have to pay anything.

OK

# Round 5

Expected output: 3.94 metres +/- 0.61

Probability of flooding: N/A %



- Flooding: water level > 3.9 metres
- Penalty for not opening the gate when flooding: 7000 tokens
- Cost of opening the gate: 2000 tokens
- Average error of the forecast system: 0.2 metres

**Do you want to open the gate to the retention basin?**

Yes

No

## Round 5 results

A flood came.

You decided to open the gate.

You protected the town, but you have to pay the farmers: 2000 tokens.

OK



## Round 5 results

A flood came.

But you did not open the gate.

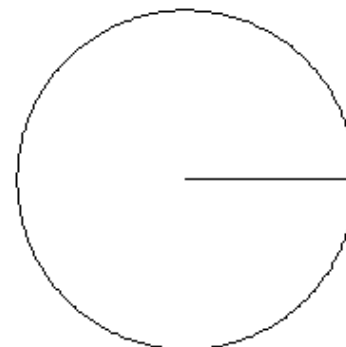
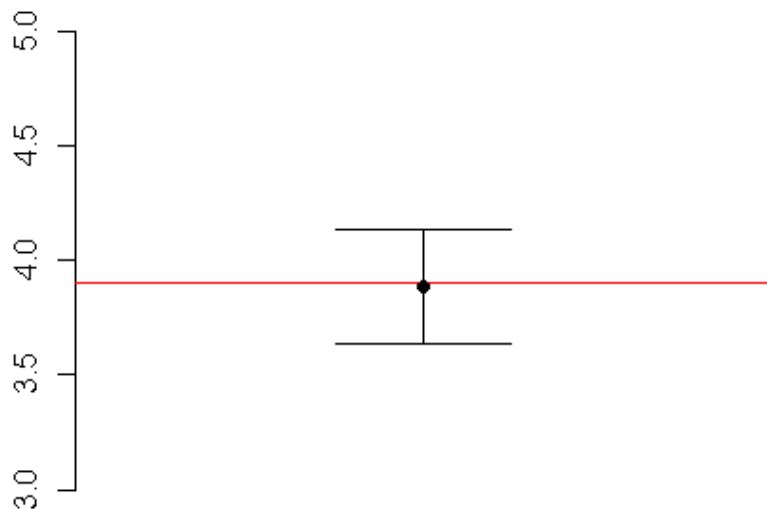
The town was flooded. You have to pay: 7000 tokens.

OK

## Round 6

Expected output: 3.89 metres  $\pm$  0.25

Probability of flooding: N/A %



- Flooding: water level  $>$  3.9 metres
- Penalty for not opening the gate when flooding: 7000 tokens
- Cost of opening the gate: 2000 tokens
- Average error of the forecast system: 0.2 metres

**Do you want to open the gate to the retention basin?**

Yes

No

## Round 6 results

It did not flood.

But you decided to open the gate.

You have to pay the farmers: 2000 tokens.

OK

## Round 6 results

It did not flood.

You did not open the gate.

You do not have to pay anything.

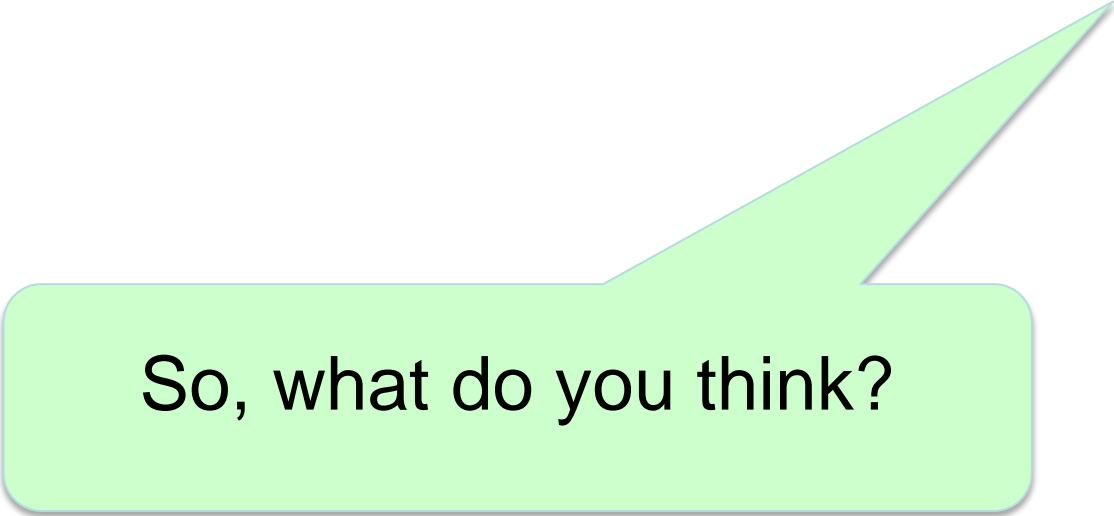
OK

## END OF GAME 2

Your final purse is...

Game over

# Do probabilistic forecasts lead to better decisions?



So, what do you think?

This game is part of HEPEX activities: [www.hepex.org](http://www.hepex.org)

Ramos, M.H., van Andel, S.J., Pappenberger, F., 2013: Do probabilistic forecasts lead to better decisions? *Hydrol. Earth Syst. Sci.*, 17, 2219-2232.