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Irrigania Game Activity - II

Kaveh Madani
Imperial College London

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What is Irrigania?

Irrigania is a web-based game about water conflict. In the game, you are a farmer within a village, dependent on limited water resources to irrigate your 10 fields. Available to you are three water sources: rainwater (RF), river water (RW), and groundwater (GW), each of which has an associated cost and revenue per field. The cost of rainwater and river water are set at $5 and $20 per field, respectively. However, the revenue from these two methods vary according to the amount of precipitation (normal, dry, or wet), for rainwater, and the amount of precipitation and use by competing farmers within your village, for river water. Groundwater, on the other hand, has a set revenue equal to $100 per field, but a varying cost that is dependent on the groundwater depth. Table 1 shows all costs and revenues per field for the different water supply options. Table 2 explains the variables found in Table 1.

Table 1. Costs and revenues for fields with different water supply. For variable explanations, see Table 2.

Type of water supply for field	Cost per field	Revenue per field
Rainfed	5	30 (in normal year) 10 (in dry year) 40 (in wet year)
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Irrigation with groundwater	$g<8 : 20 \ \ g\geq 8 : 20+(g-8)^2$	100

Table 2. Explanation of variables.

Variable	Explanation
F_{river}	Number of fields with river water irrigation
F_{gw}	Number of fields with groundwater irrigation
g	Depth to groundwater
n	Number of farmers in a village
P	Precipitation indicator (normal year: 1; dry year: 0; wet year: 2)

Objective?

To win the game of Irrigania, you must not only earn more money than the farmers in your village, but also more money than farmers in neighboring villages. To accomplish this, you will need to use an irrigation technique that maximizes profit, while conserving resources enough to keep cost down and revenue high. Your grade is determined by your rank (profit) in the class.

Rules?

1) No communication between you and any other farmer

2) Precipitation = Normal (P=1)
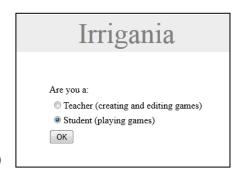
3) Number of years (rounds) = 15

Steps to Playing Irrigania

1) Go to: irrigania.ch

- click on the student option
- click ok (pressing enter does not work)

2) Enter information

- Teacher Name: Kaveh
- Village Cluster and Village name are below (page 3)
- Farmer Name: Your first name
- click log in

3) Game Play Information

- The year for which you are selecting an irrigation scheme is at the top of the page
- You are irrigating 10 fields, therefore, GW, RW, and RF must sum to 10 (the rainfed box computes itself based on GW and RW)
- Economical status shows balance this year (which is actually the previous year's profit) and accumulated profit
- Current hydrological conditions (CHC) shows depth to GW (g in the equation) and the previous year's cost of GW irrigation per field
- GW depth begins at 5.0
- The third line of CHC indicates the precipitation state (P)
- The fourth/fifth line of CHC indicates the variable k from the previous year as a percent
- Once you choose an irrigation scenario for the current year, click submit
- You will select the following year's irrigation scheme according to the schedule (page 4). You will complete only two of the 15 years each day, until the final day, which you will complete three
- It will be helpful to choose a time that all players in your village can be online, as you cannot proceed to the next year until all villagers submit the first of the two years
- Your ranking within your village will be uploaded to Facebook at the end of the day

Irrigania Village Cluster and Village Name

- Village Cluster: Orion
  - Village: Rainbow
    - David
    - Mike
    - Milad
    - Debapi
    - Michael Toth (use full name)

- Village Cluster: Andromeda
  - Village: Truthville
    - Joseph
    - Jennifer
    - Seoyoung
    - Tyler
    - Mousa

- Village Cluster: Libra
  - Village: Badwater
    - Michael Taaffe (use full name)
    - Jonathan
    - Hai
    - Sultan
    - Mahboubeh

- Village Cluster: Scorpius
  - Village: Sandwich
    - Stephanie
    - Ahmed
    - Faraz
    - Daniel

- Village Cluster: Scutum
  - Village: Hairtown
    - Steven
    - Soroush
    - Kondwani
    - Matthew

- Village Cluster: Volans
  - Village: Toxaway
    - Jose
    - Andrew
    - Kunal
    - Jaclyn
    - Saeed

*If you have any questions, please post on our Facebook page so that I can answer for the entire class
*names are those found on Canvas

Schedule

*All submissions must be complete prior to 10:00 PM on each day

Monday, 01/28/13

- Year 1 and 2

Tuesday, 01/29/13

- Year 3 and 4

Wednesday, 01/30/13

- Year 5 and 6

Thursday, 01/31/13

- Year 7 and 8

Friday, 02/01/13

- Year 9 and 10

Saturday, 02/02/13

- Year 11 and 12

Sunday, 02/03/13

- Year 13, 14, and 15

What is Irrigania?

Irrigania is a web-based game about water conflict. In the game, you are a farmer within a village, dependent on limited water resources to irrigate your 10 fields. Available to you are three water sources: rainwater (RF), river water (RW), and groundwater (GW), each of which has an associated cost and revenue per field. The cost of rainwater and river water are set at $5 and $20 per field, respectively. However, the revenue from these two methods vary according to the amount of precipitation (normal, dry, or wet), for rainwater, and the amount of precipitation and use by competing farmers within your village, for river water. Groundwater, on the other hand, has a set revenue equal to $100 per field, but a varying cost that is dependent on the groundwater depth. Table 1 shows all costs and revenues per field for the different water supply options. Table 2 explains the variables found in Table 1.

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Irrigation with groundwater	$g < 8 : 20 \quad g \geq 8 : 20 + (g-8)^2$	100

Table 2. Explanation of variables.

Variable	Explanation
F_{river}	Number of fields with river water irrigation
F_{gw}	Number of fields with groundwater irrigation
g	Depth to groundwater
n	Number of farmers in a village
P	Precipitation indicator (normal year: 1; dry year: 0; wet year: 2)

Objective?

To win the game of Irrigania, you must not only earn more money than the farmers in your village, but also more money than farmers in neighboring villages. To accomplish this, you will need to use an irrigation technique that maximizes profit, while conserving resources enough to keep cost down and revenue high. Your grade is determined by your rank (profit) in the class.

Rules?

1) No communication constraints

2) Precipitation = Normal (P=1)
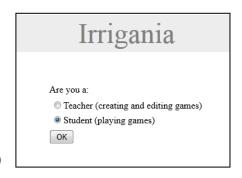
3) Number of years (rounds) = 15

Steps to Playing Irrigania

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- click on the student option
- click ok (pressing enter does not work)

2) Enter information

- Teacher Name: Kaveh
- Village Cluster and Village name are below (page 3)
- Farmer Name: Your first name
- click log in

3) Game Play Information

- The year for which you are selecting an irrigation scheme is at the top of the page
- You are irrigating 10 fields, therefore, GW, RW, and RF must sum to 10 (the rainfed box computes itself based on GW and RW)
- Economical status shows balance this year (which is actually the previous year's profit) and accumulated profit
- Current hydrological conditions (CHC) shows depth to GW (g in the equation) and the previous year's cost of GW irrigation per field
- GW depth begins at 5.0
- The third line of CHC indicates the precipitation state (P)
- The fourth/fifth line of CHC indicates the variable k from the previous year as a percent
- Once you choose an irrigation scenario for the current year, click submit
- You will select the following year's irrigation scheme according to the schedule (page 4). You will complete **five** of the 15 years each day
- Choose a time that all players in your village can be online, as you need all farmers to be online to submit your irrigation scheme
- Your ranking within your village will be uploaded to Facebook at the end of the day

Irrigania Village Cluster and Village Name

- Village Cluster: Plato
  - Village: Life
    - Saeed
    - David
    - Seoyoung
    - Sultan
    - Michael Toth (use full name)

- Village Cluster: Aristotle
  - Village: Trix
    - Joseph
    - Soroush
    - Stephanie
    - Kunal
    - Michael Taaffe (use full name)

- Village Cluster: Socrates
  - Village: Pops
    - Faraz
    - Jonathan
    - Jaclyn
    - Mahboubeh

- Village Cluster: Descartes
  - Village: Cheerios
    - Mousa
    - Kondwani
    - Mike
    - Daniel

- Village Cluster: Aquinas
  - Village: Kix
    - Milad
    - Jose
    - Steven
    - Matthew
    - Tyler

- Village Cluster: Epicurus
  - Village: Wheaties
    - Ahmed
    - Andrew
    - Hai
    - Jennifer
    - Debapi

Schedule

*All submissions must be complete prior to 10:00 PM on each day

Thursday, 02/07/13

- Year 1-5

Friday, 02/08/13

- Year 6-10

Monday, 02/09/13

- Year 11-15

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Table 2. Explanation of variables.

Variable	Explanation
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F_{gw}	Number of fields with groundwater irrigation
g	Depth to groundwater
n	Number of farmers in a village
P	Precipitation indicator (normal year: 1; dry year: 0; wet year: 2)

Objective?

To win this game of Irrigania, your village must earn a higher average profit than the neighboring villages. To accomplish this, you will need to use an irrigation technique that maximizes profit, while conserving resources enough to keep cost down and revenue high. Your grade is determined by your villages rank (average profit) in the class.

Rules?

1) No communication constraints

2) Precipitation = Normal (P=1)
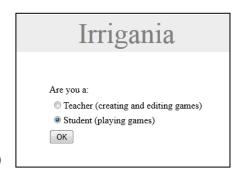
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- GW depth begins at 5.0
- The third line of CHC indicates the precipitation state (P)
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- Once you choose an irrigation scenario for the current year, click submit
- You will select the following year's irrigation scheme according to the schedule (page 4). You will complete **five** of the 15 years each day
- Choose a time that all players in your village can be online, as you need all farmers to be online to submit your irrigation scheme
- Your ranking within your village will be uploaded to Facebook at the end of the day

Irrigania

Are you a:
- ○ Teacher (creating and editing games)
- ● Student (playing games)

[OK]

Irrigania

Teacher Name:	Kaveh
VillageCluster Name:	
Village Name:	
Farmer Name:	Your first name

[Log In]

Year 2

Farming decisions:

Irrigation (Groundwater)	0
Irrigation (River)	0
Rainfed	10

Economical status:

Balance this year	#
Accumulated balance	#

Current hydrological conditions:

Depth to groundwater	5.8
Costs for irrigation using groundwater (per field, last year)	20

Year 1 was a **normal** year

There was not enough riverwater to irrigate all fields sufficiently, the harvest was therefore reduced to **98%**.

[Submit]

Villages and Users:

Village_1
- Farmer_1 (Irrigating)
- Farmer_2 (Irrigating)
- Farmer_3 (Irrigating)

Irrigania Village Cluster and Village Name

- Village Cluster: Mimas
  - Village: Armadillo
    - Jennifer
    - David
    - Faraz
    - Matthew
    - Kunal

- Village Cluster: Tethys
  - Village: Mosquito
    - Michael Toth (use full name)
    - Mousa
    - Jonathan
    - Jose
    - Jaclyn

- Village Cluster: Dione
  - Village: Alligator
    - Sultan
    - Joseph
    - Ahmed
    - Debapi

- Village Cluster: Rhea
  - Village: Turtle
    - Seoyoung
    - Michael Taaffe (use full name)
    - Daniel
    - Milad
    - Andrew

- Village Cluster: Titan
  - Village: Manatee
    - Tyler
    - Hai
    - Stephanie
    - Kondwani
    - Saeed

- Village Cluster: Iapetus
  - Village: Osprey
    - Mahboubeh
    - Mike
    - Steven
    - Soroush

Schedule

*All submissions must be complete prior to 10:00 PM on each day

Wednesday, 02/13/13

- Year 1-5

Thursday, 02/14/13

- Year 6-10

Monday, 02/18/13

- Year 11-15

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Objective?

To win the game of Irrigania, you must earn more money than the farmers in your village. To accomplish this, you will need to use an irrigation technique that maximizes profit, while conserving resources enough to keep cost down and revenue high. Each village will play Irrigania for a different number of years, therefore, your grade will be determined by your rank in your village only, not the entire class.

Rules?

1) No communication allowed

2) Precipitation = Random each year (P=0, 1, or 2)

3) Number of years (rounds) = Unknown
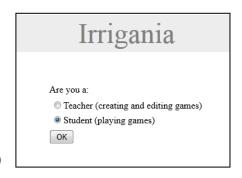
4) Villager's strategies shown after each year

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- Choose a time that all players in your village can be online, as you need all farmers to be online to submit your irrigation scheme
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Irrigania Village Cluster and Village Name

- Village Cluster: Audi
    - o Village: Nike
        - Michael Toth (use full name)
        - Michael Taaffe (use full name)
        - Kondwani
        - Jaclyn

- Village Cluster: Jaguar
    - o Village: Adidas
        - David
        - Mousa
        - Andrew
        - Hai
        - Steven

- Village Cluster: Volvo
    - o Village: Puma
        - Faraz
        - Sultan
        - Seoyoung
        - Soroush

- Village Cluster: Ferrari
    - o Village: Reebok
        - Matthew
        - Jonathan
        - Joseph
        - Daniel
        - Saeed

- Village Cluster: Porsche
    - o Village: Asics
        - Kunal
        - Ahmed
        - Mahboubeh
        - Tyler

- Village Cluster: Infiniti
    - o Village: Skechers
        - Milad
        - Stephanie
        - Mike
        - Debapi

Schedule

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Wednesday, 02/27/13

- All years

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Rules?

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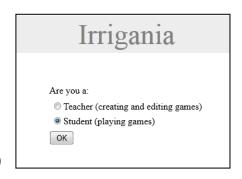
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Irrigania Village Cluster and Village Name

- Village Cluster: Radio
  - Village: Neon
    - Ahmed
    - Mahboubeh
    - Soroush
    - Mike
    - Michael Toth

- Village Cluster: Micro
  - Village: Helium
    - Hai
    - Steven
    - Stephanie
    - Seoyoung
    - Matthew

- Village Cluster: Infrared
  - Village: Argon
    - Andrew
    - Sultan
    - Michael Taaffe
    - Saeed
    - Daniel

- Village Cluster: Visible
  - Village: Krypton
    - Joseph
    - Kondwani
    - Jonathan
    - David

- Village Cluster: Ultraviolet
  - Village: Xenon
    - Jaclyn
    - Debapi
    - Kunal
    - Mousa

- Village Cluster: Gamma
  - Village: Radon
    - Milad
    - Jennifer
    - Tyler
    - Faraz

Schedule

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Thursday, 03/28/13

- All years

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Rules?

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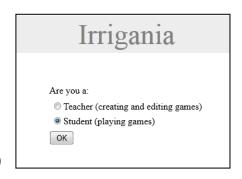
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Irrigania Village Cluster and Village Name

- Village Cluster: knight
  - Village: coffee
    - Kondwani
    - Matthew
    - Michael Taaffe
    - Milad
    - Ahmed

- Village Cluster: gator
  - Village: latte
    - Jaclyn
    - Sultan
    - Debapi
    - Jennifer
    - Kunal

- Village Cluster: indian
  - Village: mocha
    - Tyler
    - Jonathan
    - Hai
    - Steven
    - Stephanie

- Village Cluster: bull
  - Village: cappuccino
    - Mahboubeh
    - David
    - Daniel
    - Joseph

- Village Cluster: panther
  - Village: espresso
    - Soroush
    - Andrew
    - Mousa
    - Michael Toth

- Village Cluster: owl
  - Village: macchiato
    - Mike
    - Faraz
    - Seoyoung
    - Saeed

Schedule

*All submissions must be complete prior to 10:00 PM on each day

Thursday, 04/01/13

- All years