**SUPPLEMENTARY MATERIAL**

**Questionnaire 1 – Agricultural water users**

*This questionnaire attempts to better understand the relationship between all the water stakeholders of the Jucar River Basin. The main objective is to analyze how water authorities are managing the water resources along this basin. The data from this questionnaire will be only used for academic purposes.*

***It is an anonymous questionnaire and all the information will be processed with the maximum confidentiality.***

*If you do not know the answer to any of the questions, please just leave it blank*

1. The collective of people you belong to is:

|  |  |
| --- | --- |
| Farmer |  |
| Ecologist |  |
| Agrifood company worker |  |
| Manager |  |
| Other |  |

1. Your specific location into the Jucar Basin is:

|  |  |
| --- | --- |
| Canal Jucar-Turia |  |
| Acequia Real del Jucar |  |
| Sueca |  |
| Cullera |  |
| Cuatro Pueblos |  |
| Escalona |  |
| Carcajente |  |
| Other |  |

1. Role in the organization you belong to:

|  |  |
| --- | --- |
| Manager/Responsible |  |
| Member |  |

1. Could you provide some approximate information about the water user association you belong to?

|  |  |
| --- | --- |
| Approximate number of members in your organization | Approximate number of hectares of irrigation agriculture |
|  |  |

1. Could you please indicate some information about your own farmland:

|  |  |
| --- | --- |
| Approximate number of hectares | Percentage of fruit trees (0–100%) |
|  |  |

1. We are interested to know your opinion on some water policies used to face water drought periods in the Jucar Basin. We are interested in three water policies:
2. Water quotas
3. Definition of water rights
4. Modernization of the irrigation technology.
5. Starting with Policy A (water quotas). Could you tell us your opinion on this policy in the Jucar Basin?

Being 1 the lowest value (very bad) and 5 the highest value (very good)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| Do you think is a good policy to address water drought? |  |  |  |  |  |
| Do you think water authorities have efficiently managed this policy? |  |  |  |  |  |
| Do you think this policy treats everyone similarly? |  |  |  |  |  |

1. About Policy B (water rights). Could you tell us your opinion on this policy in the Jucar Basin? Being 1 the lowest value (very bad) and 5 the highest value (very good)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| Do you think is a good policy to address water drought? |  |  |  |  |  |
| Do you think water authorities have efficiently managed this policy? |  |  |  |  |  |
| Do you think this policy treats everyone similarly? |  |  |  |  |  |

1. About Policy C (irrigation technologies modernization). Could you tell us your opinion on this policy in the Jucar Basin? Being 1 the lowest value (very bad) and 5 the highest value (very good)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| Do you think is a good policy to address water drought? |  |  |  |  |  |
| Do you think water authorities have efficiently managed this policy? |  |  |  |  |  |
| Do you think this policy treats everyone similarly? |  |  |  |  |  |

1. Please, could you rank the previous policies depending on your better or worse opinion of them? Being 1 the best policy and 3 the worst

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| Policy A – Implementation of water quotas |  |  |  |
| Policy B – Assignment of water rights |  |  |  |
| Policy C – Improvement of the irrigation technology |  |  |  |

1. The next questions are related to the relationship that you have with the different water authorities in charge of water management in the Jucar Basin. Being 1 the lowest value (no involvement) and 5 the highest (very high involvement):

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| Do you actively participate in the decisions and/or activities of the water user association you belong to? |  |  |  |  |  |
| Do you participate in the decisions and/or activities of the Jucar River Basin Authority (JRBA)? |  |  |  |  |  |
| Do you participate in the decisions and/or activities of any other water authority different from the previous one?  (*for example national water agencies*) |  |  |  |  |  |

1. What kind of means has your organization used to influence the JRBA’s policy direction and extent? Mark the ones you recognize.

|  |  |
| --- | --- |
| Formal and/or informal meeting with the water authorities |  |
| Demonstrations |  |
| Publicity in the media (newspapers, journals, television) |  |
| Letters to water authorities |  |
| Reports (go to Court when rights are violated) |  |
| Using the help and/or collaborations of political parties |  |
| Others (indicate): |  |

1. Please assign a cost value or effort to each of the items previously selected.

|  |  |  |  |
| --- | --- | --- | --- |
|  | High | Medium | Low |
| Formal and/or informal meetings |  |  |  |
| Demonstrations |  |  |  |
| Publicity in the media (newspapers, journals, television) |  |  |  |
| Letters to water authorities |  |  |  |
| Reports (go to Court when the rights are violated) |  |  |  |
| Political parties |  |  |  |
| Others |  |  |  |

1. Please assign a revenue value or effectiveness to each of the items previously selected.

|  |  |  |  |
| --- | --- | --- | --- |
|  | Not Effective | Somewhat Effective | Highly Effective |
| Formal and/or informal meetings |  |  |  |
| Demonstrations |  |  |  |
| Publicity in the media (newspapers, journals, television) |  |  |  |
| Letters to water authorities |  |  |  |
| Reports (go to Court when the rights are violated) |  |  |  |
| Political parties |  |  |  |
| Others |  |  |  |

***We appreciate your help filling out this questionnaire***

*\*This questionnaire was distributed to farmers in Albacete (upstream) and Valencia (downstream). The questionnaire was almost the same except for three questions that were not asked in the case of Albacete. Questions 1, 2, and 4 that specifically refer to the farmers’ water user association are not valid in Albacete due to the fact that in this area all farmers belong to the same water user association (JCRMO).*

**Questionnaire 2 - Urban water users (Water Utilities)**

*This questionnaire attempts to better understand the relationship between all the water stakeholders of the Jucar River Basin. The main objective is to analyze how water authorities are managing the water resources along this Basin. The data from this questionnaire will be only used for academic purposes.*

***It is an anonymous questionnaire and all the information will be processed with the maximum confidentiality.***

*If you do not know the answer to any of the questions, please just leave it blank*

1. Your company is:

|  |  |
| --- | --- |
| Private company |  |
| Public company |  |
| Mix of private and public company |  |

1. In the Jucar Basin you are located in:

|  |  |
| --- | --- |
| Upper Jucar (upstream) |  |
| Lower Jucar (downstream) |  |

1. We are interested to know your opinion on some water policies used to face water drought periods in the Jucar Basin. We are interested in three water policies:
2. Water quotas
3. Definition of water rights
4. Modernization of the irrigation technology.
5. Starting with Policy A (water quotas). Could you tell us your opinion on this policy in the Jucar Basin? Being 1 the lowest value (very bad) and 5 the highest value (very good)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| Do you think is a good policy to address water drought? |  |  |  |  |  |
| Do you think water authorities have efficiently managed this policy? |  |  |  |  |  |
| Do you think this policy treats everyone similarly? |  |  |  |  |  |

1. About Policy B (water rights). Could you tell us your opinion on this policy in the Jucar Basin? Being 1 the lowest value (very bad) and 5 the highest value (very good)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| Do you think is a good policy to address water drought? |  |  |  |  |  |
| Do you think water authorities have efficiently managed this policy? |  |  |  |  |  |
| Do you think this policy treats everyone similarly? |  |  |  |  |  |

1. About Policy C (irrigation technologies modernization). Could you tell us your opinion on this policy in the Jucar Basin? Being 1 the lowest value (very bad) and 5 the highest value (very good)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| Do you think is a good policy to address water drought? |  |  |  |  |  |
| Do you think water authorities have efficiently managed this policy? |  |  |  |  |  |
| Do you think this policy treats everyone similarly? |  |  |  |  |  |

1. Please, could you rank the previous policies depending on your better or worse opinion of them? Being 1 the best policy and 3 the worst

|  |  |  |  |
| --- | --- | --- | --- |
|  | 1 | 2 | 3 |
| Policy A – Implementation of water quotas |  |  |  |
| Policy B – Assignment of water rights |  |  |  |
| Policy C – Improvement of the irrigation technology |  |  |  |

1. The next questions are related to the relationship that you have with the different water authorities in charge of the Jucar water resources management. Being 1 the lowest value (no involvement) and 5 the highest (very high involvement):

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| Do you participate in the decisions and/or activities of the Jucar River Basin Authority (JRBA)? |  |  |  |  |  |
| Do you participate in the decisions and/or activities of the any other water authority different from the previous one?  (*for example national water agencies*) |  |  |  |  |  |

1. What kind of means has your organization used to influence the JRBA’s policy direction and extent? Mark the ones you recognize.

|  |  |
| --- | --- |
| Formal and/or informal meeting with the water authorities |  |
| Demonstrations |  |
| Publicity in the media (newspapers, journals, television) |  |
| Letters to water authorities |  |
| Reports (go to Court when the rights are violated) |  |
| Using the help and/or collaborations of political parties |  |
| Others (indicate): |  |

1. Please assign a cost value or effort to the selected previous items.

|  |  |  |  |
| --- | --- | --- | --- |
|  | High | Medium | Low |
| Formal and/or informal meetings |  |  |  |
| Demonstrations |  |  |  |
| Publicity on the media (newspapers, journals, television) |  |  |  |
| Letters to water authorities |  |  |  |
| Reports (go to Court when the rights are violated) |  |  |  |
| Political parties |  |  |  |
| Others |  |  |  |

1. Please assign a reward value or effectiveness to the selected previous items.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Not Effective** | **Somewhat Effective** | **Highly Effective** |
| Formal and/or informal meetings |  |  |  |
| Demonstrations |  |  |  |
| Publicity in the media (newspapers, journals, television) |  |  |  |
| Letters to water authorities |  |  |  |
| Reports (go to Court when the rights are violated) |  |  |  |
| Political parties |  |  |  |
| Others |  |  |  |

***We appreciate your help filling out this questionnaire***

**APPENDIX**

**Summary Statistics**

Table A1. Summary statistics results for upstream irrigators (Albacete)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | | **n** | **Mean** | **SD** | **Min** | **Max** |
| 1. Ha per farmland (ha) | | 133 | 106.99 | 160.20 | 0 | 1,030 |
| 2A. Percentage of fruit-trees per farmland (%) | | 133 | 20.53 | 35.03 | 0 | 100 |
| 2B. Ha with fruit-trees (ha) | | 133 | 17.59 | 37.94 | 0 | 206 |
| 3. Efficiency of Policy A | | 132 | 2.88 | 1.32 | 1 | 5 |
| 4. Efficiency of Policy B | | 132 | 2.97 | 1.15 | 1 | 5 |
| 5. Efficiency of Policy C | | 133 | 2.9 | 1.17 | 1 | 5 |
| 6. Management of Policy A | | 131 | 3.37 | 1.5 | 1 | 5 |
| 7. Management of Policy B | | 131 | 2.82 | 1.3 | 1 | 5 |
| 8. Management of Policy C | | 130 | 2.44 | 1.15 | 1 | 5 |
| 9. Fairness of Policy A | | 133 | 4.25 | 1.03 | 1 | 5 |
| 10. Fairness of Policy B | | 132 | 2.83 | 1.04 | 1 | 5 |
| 11. Fairness of Policy C | | 133 | 2.71 | 1.12 | 1 | 5 |
| 12. Rank of Policy A | | 132 | 2.3 | 0.8 | 1 | 3 |
| 13. Rank of Policy B | | 132 | 1.97 | 0.81 | 1 | 3 |
| 14. Rank of Policy C | | 132 | 1.73 | 0.75 | 1 | 3 |
| 15. Involvement with your irrigators’ association (local) | | 130 | 3.5 | 0.97 | 1 | 5 |
| 16. Involvement with the basin authority (JRBA) | | 130 | 3.86 | 1 | 1 | 5 |
| 17. Involvement with other water authority (national) | | 121 | 2.98 | 0.98 | 1 | 5 |
| 18. Effort | Meetings | 124 | 1.81 | 0.58 | 1 | 3 |
| Demonstrations | 77 | 1.95 | 0.65 | 1 | 3 |
| Media | 98 | 2.27 | 0.55 | 1 | 3 |
| Letters | 121 | 1.81 | 0.61 | 1 | 3 |
| Reports | 88 | 1.58 | 0.62 | 1 | 3 |
| Political Parties | 94 | 1.92 | 0.55 | 1 | 3 |
| 19. Effectiveness | Meetings | 131 | 1.87 | 0.38 | 1 | 3 |
| Demonstrations | 82 | 1.93 | 0.68 | 1 | 3 |
| Media | 104 | 2.18 | 0.46 | 1 | 3 |
| Letters | 126 | 1.91 | 0.4 | 1 | 3 |
| Reports | 91 | 2.21 | 0.61 | 1 | 3 |
| Political parties | 94 | 2.05 | 0.57 | 1 | 3 |

*Note*: Policy A is water quotas, Policy B is water rights, and Policy C is irrigation modernization. Queries 3 to 11 are ranked from 1 (‘very bad’/‘not at all’) to 5 (‘very good’/‘totally’). Queries 12 to 14 are ranked from 1 (‘best policy’) to 3 (‘worst policy’). Queries 15 to 17 are ranked from 1 (‘no involvement’) to 5 (‘very high involvement’). Queries 18 and 19 are ranked from 1 (‘no or low effort’/‘no or low effectiveness’) to 3 (‘high effort’/‘high effectiveness’).

Table A2. Summary statistics results for downstream irrigators (Valencia)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | | **n** | **Mean** | **SD** | **Min** | **Max** |
| 1. Ha per farmland (ha) | | 199 | 2.52 | 3.65 | 0 | 25 |
| 2A. Percentage of fruit-trees per farmland (%) | | 199 | 79.94 | 32.21 | 0 | 100 |
| 2B. Ha with fruit-trees (ha) | | 199 | 2.12 | 3.22 | 0 | 18 |
| 3. Efficiency of Policy A (water quotas) | | 193 | 3.44 | 1.32 | 1 | 5 |
| 4. Efficiency of Policy B (water rights) | | 178 | 2.75 | 1.35 | 1 | 5 |
| 5. Efficiency of Policy C (irrigation tech.) | | 176 | 2.18 | 1.43 | 1 | 5 |
| 6. Management of Policy A | | 185 | 2.82 | 1.50 | 1 | 5 |
| 7. Management of Policy B | | 183 | 2.35 | 1.33 | 1 | 5 |
| 8. Management of Policy C | | 170 | 2.11 | 1.39 | 1 | 5 |
| 9. Fairness of Policy A | | 190 | 3.62 | 1.45 | 1 | 5 |
| 10. Fairness of Policy B | | 183 | 2.97 | 1.42 | 1 | 5 |
| 11. Fairness of Policy C | | 170 | 2.76 | 1.59 | 1 | 5 |
| 12. Rank of Policy A | | 191 | 1.85 | 0.75 | 1 | 3 |
| 13. Rank of Policy B | | 191 | 2.31 | 0.71 | 1 | 3 |
| 14. Rank of Policy C | | 190 | 1.85 | 0.86 | 1 | 3 |
| 15. Involvement with your irrigators’ association (local) | | 190 | 1.63 | 1.21 | 1 | 5 |
| 16. Involvement with the basin authority (JRBA) | | 189 | 1.57 | 1.17 | 1 | 5 |
| 17. Involvement with other water authority (national) | | 187 | 1.59 | 1.20 | 1 | 5 |
| 18. Effort | Meetings | 154 | 2.14 | 0.71 | 1 | 3 |
| Demonstrations | 122 | 2.17 | 0.83 | 1 | 3 |
| Media | 131 | 1.93 | 0.82 | 1 | 3 |
| Letters | 125 | 1.94 | 0.80 | 1 | 3 |
| Reports | 113 | 1.81 | 0.84 | 1 | 3 |
| Political parties | 107 | 1.86 | 0.85 | 1 | 3 |
| 19. Effectiveness | Meetings | 155 | 2.39 | 0.62 | 1 | 3 |
| Demonstrations | 132 | 2.52 | 0.62 | 1 | 3 |
| Media | 128 | 2.47 | 0.68 | 1 | 3 |
| Letters | 139 | 2.47 | 0.75 | 1 | 3 |
| Reports | 127 | 2.38 | 0.76 | 1 | 3 |
| Political parties | 118 | 2.73 | 0.53 | 1 | 3 |

*Note*: Policy A is water quotas, Policy B is water rights, and Policy C is irrigation modernization. Queries 3 to 11 are ranked from 1 (‘very bad’/‘not at all’) to 5 (‘very good’/‘totally’). Queries 12 to 14 are ranked from 1 (‘best policy’) to 3 (‘worst policy’). Queries 15 to 17 are ranked from 1 (‘no involvement’) to 5 (‘very high involvement’). Queries 18 and 19 are ranked from 1 (‘no or low effort’/‘no or low effectiveness’) to 3 (‘high effort’/‘high effectiveness’).

Table A3. Summary statistics results for urban water companies

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Urban Water Company** | | **Water Utility 1 (U1)** | **Water Utility 2**  **(U2)** | **Water Utility 3**  **(U3)** |
| 1. Type of company | | Mixed (private/public) | Mixed (private/public) | Mixed (private/public) |
| 2. Location | | Downstream | Downstream | Upstream |
| 3. Number of employees | | 444 | 300 | n.r.d. |
| 4. Number of households | | 661,500 | 200,000 | 177,000 |
| 5. Volume of water supplied (Mm3/yr) | | 102 | 22 | 31 |
| 6. Percentage of groundwater supplied (%) | | 20% | 0% | 80% |
| 7. Percentage of desalinized water supplied (%) | | 25% | 54% | n.r.d |
| 8. Efficiency of Policy A | | 5 | 4 | 3 |
| 9. Efficiency of Policy B | | 5 | 4 | 2 |
| 10. Efficiency of Policy C | | 5 | 4 | 3 |
| 11. Management of Policy A | | 5 | 3 | 3 |
| 12. Management of Policy B | | 2 | 3 | 2 |
| 13. Management of Policy C | | – | 3 | 3 |
| 14. Fairness of Policy A | | 1 | 3 | 2 |
| 15. Fairness of Policy B | | 1 | 3 | 4 |
| 16. Fairness of Policy C | | – | 3 | 3 |
| 17. Rank of Policy A | | 2 | 2 | 1 |
| 18. Rank of Policy B | | 1 | 1 | 3 |
| 19. Rank of Policy C | | 3 | 3 | 2 |
| 20. Involvement with the JRBA | | 5 | 4 | 1 |
| 21. Involvement with other water authority (national) | | 1 | 4 | 2 |
| 22. Effort | Meetings | 2 | 3 | 2 |
| Demonstrations | – | 1 | 1 |
| Media | – | 2 | – |
| Letters | – | 2 | 2 |
| Reports | – | 3 | 1 |
| Political parties | – | 1 | – |
| Other | – | – | – |
| 23. Effectiveness | Meetings | 3 | 3 | – |
| Demonstrations | – | 1 | – |
| Media | – | 3 | – |
| Letters | – | 2 | – |
| Reports | – | 2 | – |
| Political parties | – | 1 | – |
| Other | – | – | – |

*Note*: Policy A is water quotas, Policy B is water rights, and Policy C is irrigation modernization. Queries 8 to 16 are ranked from 1 (‘very bad’/‘not at all’) to 5 (‘very good’/‘totally’). Queries 17 to 19 are ranked from 1 (‘best policy’) to 3 (‘worst policy’). Queries 20 and 21 are ranked from 1 (‘no involvement’) to 5 (‘very high involvement’). Queries 22 and 23 are ranked from 1 (‘no or low effort’/‘no or low effectiveness’) to 3 (‘high effort’/‘high effectiveness’). n.r.d - No reported data.

Table A4. T-test comparison of the policy opinion variables between the upstream and downstream irrigator groups

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Political variables** | **Obs.** | **t-test** | **p-value** | **Significance** |
| Efficiency of Policy A | 323 | −3.7642 | 0.0002 | \*\* |
| Efficiency of Policy B | 314 | 3.1783 | 0.0016 | \*\* |
| Efficiency of Policy C | 321 | 4.2782 | 0.0000 | \*\* |
| Management of Policy A | 308 | 1.4835 | 0.1390 |  |
| Management of Policy B | 312 | 3.1395 | 0.0019 | \*\* |
| Management of Policy C | 313 | −1.0061 | 0.3153 |  |
| Fairness of Policy A | 307 | 4.7371 | 0.0000 | \*\* |
| Fairness of Policy B | 298 | 2.1759 | 0.0303 | \* |
| Fairness of Policy C | 301 | −0.3562 | 0.7219 |  |

*Note*: \* *p* < 0.05, \*\* *p* < 0.01. Policy A is water quotas, Policy B is water rights, and Policy C is irrigation modernization.