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TIIAME-NRU:
Strategy and activities in the field of climate change and adaptation

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"TIIAME"
National Research University

First-class regionally recognized academic and research university with an almost 100-year tradition known for its top programs in:

- **Engineering** (water resources, environment, irrigation, electrification and automation, agricultural mechanization),
- land management and agricultural economics/management & marketing, jurisprudence, remote sensing, artificial intelligence and etc.
- 3 campuses, 40 undergraduate – 36 graduate -16 doctorate programs

Rankings:

- #1 - in the National ranking of the Republic of Uzbekistan
- 301-320 - in the QS ASIA University Rankings

QS World University Rankings by Subject 2023

- #451-500 Engineering & Technology
- #501-520 Natural Science
- #351-400 Environmental Sciences

QS WORLD UNIVERSITY RANKINGS®

THE WORLD UNIVERSITY RANKINGS

- 201-300 – in the THE subject rankings "Clean water and Sanitation" and "Life on Land"

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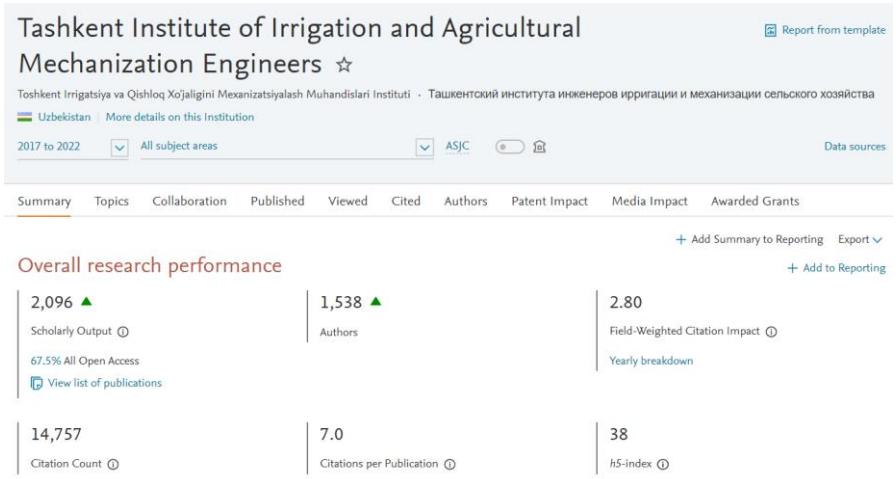
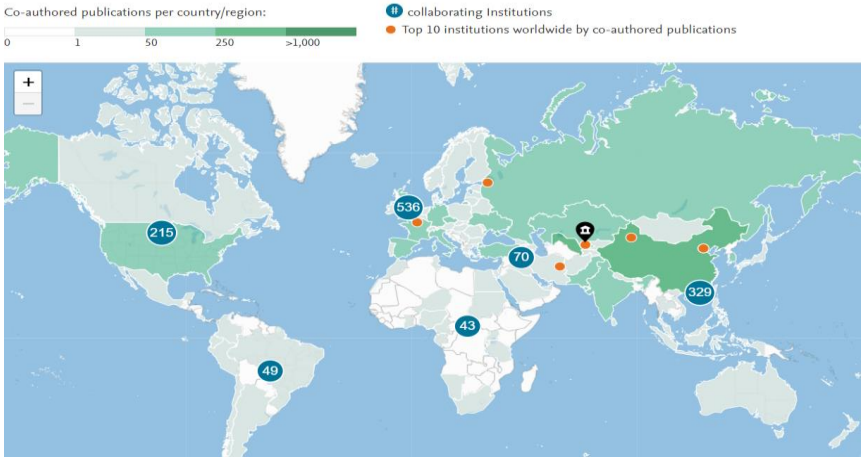
INTERNATIONAL COLLABORATION

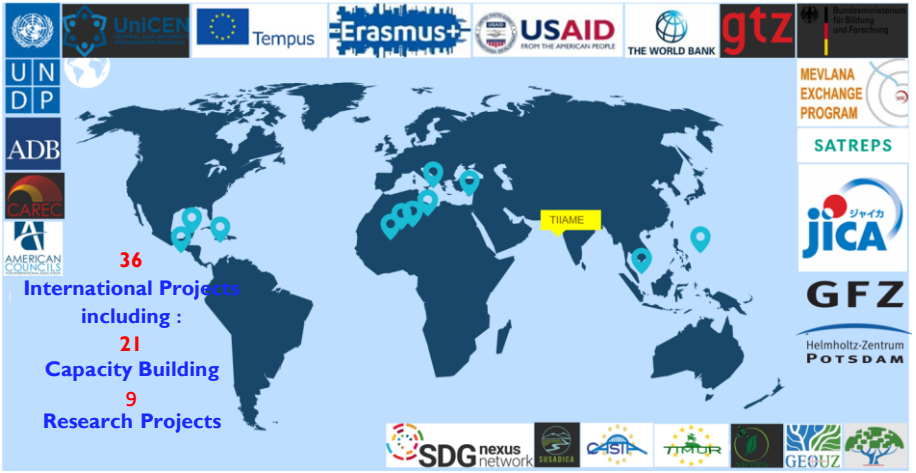
Publication activity of the "TIIAME" NRU staff



Collaboration with International Partners



International Collaboration



Memorandums, Agreements and Contracts

Over 100 signed and ongoing memorandums and collaboration projects. Including with:

- GTZ - German Technical Cooperation
- DAAD – German Academic Exchange Service
- GFZ - German Research Centre for Geosciences
- JLU- Justus Liebig University Giessen
- Berlin Technical University
- München Technical University
- Humboldt University
- ZALF - Leibniz Centre for Agricultural Landscape Research
- IAMO-Leibniz Institute of Agricultural Development in Transition Economies
- …….

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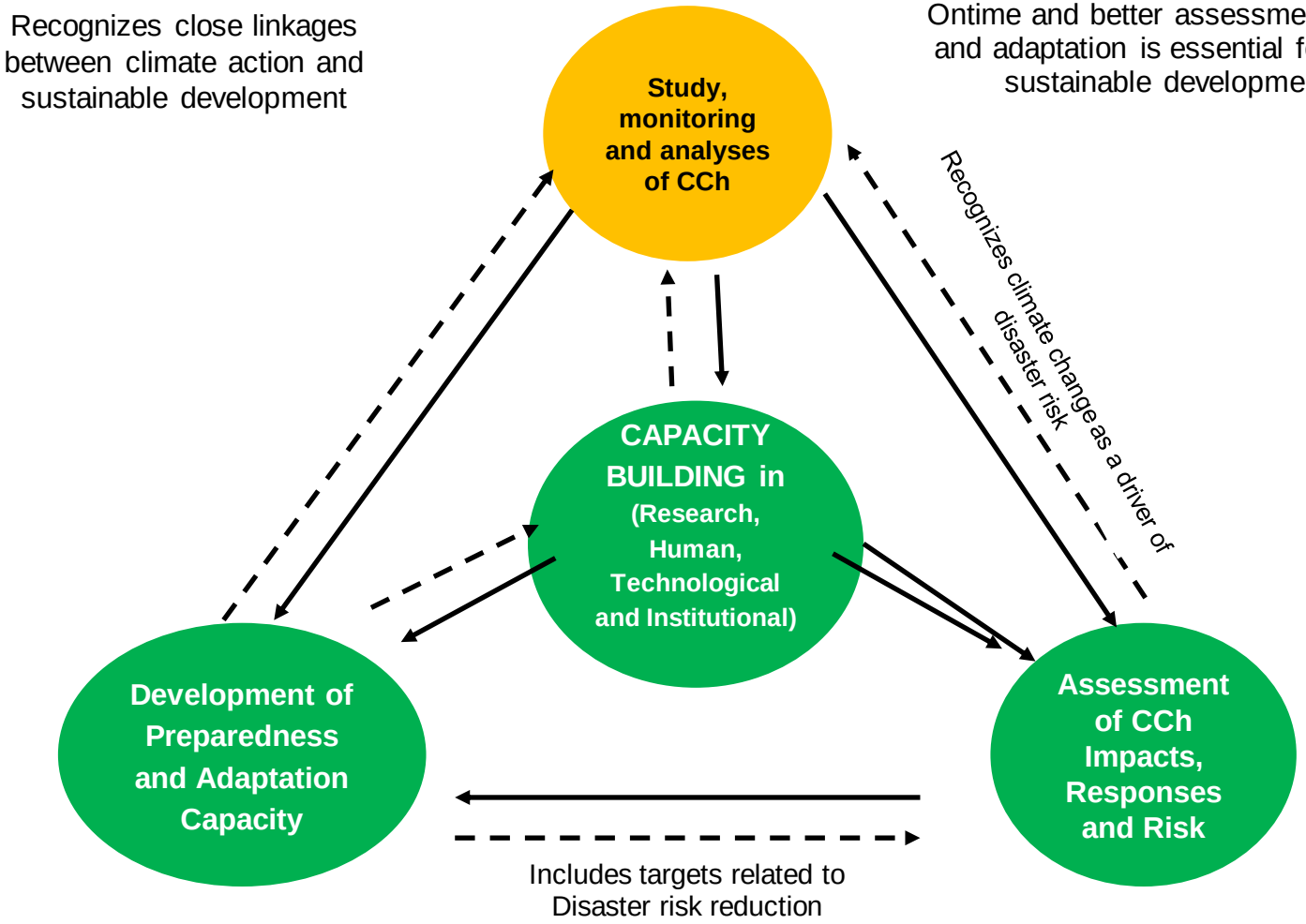
SCOPE of Climate focused Activities



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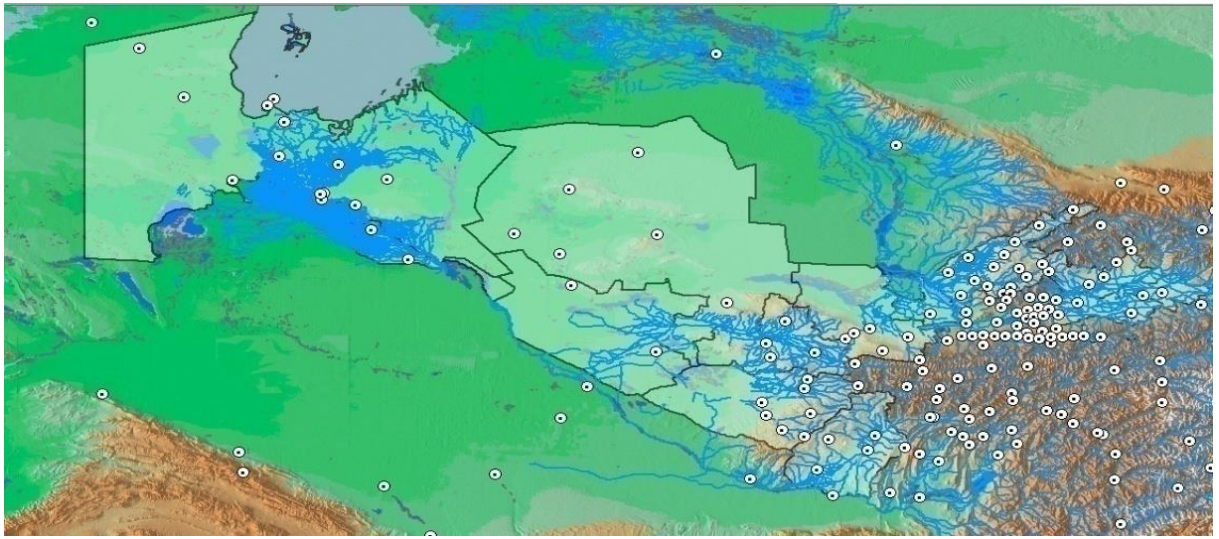
PILLAR 1. Assessment of changes in climate parameters in Central Asia and Uzbekistan

Changes in precipitation, temperature, and water runoff of water bodies in Uzbekistan

- climate change assessed through the changes in temperature factor, the amount of precipitation, and the availability of water in the water bodies. Collected and analyses all available data at the main observation posts on the territory of the Republic of Uzbekistan. Some series of observations dating back to 1914.
- Changes in water conditions of water bodies under climate change assessed based on the analysis of recorded data, changes in temperature, precipitation, and water runoff. The analysis included a series of observations from 1950 (the time when climate change began to be noticeable) to 2021 (the current time).



Location of weather stations where observations of air temperature were conducted or are being conducted

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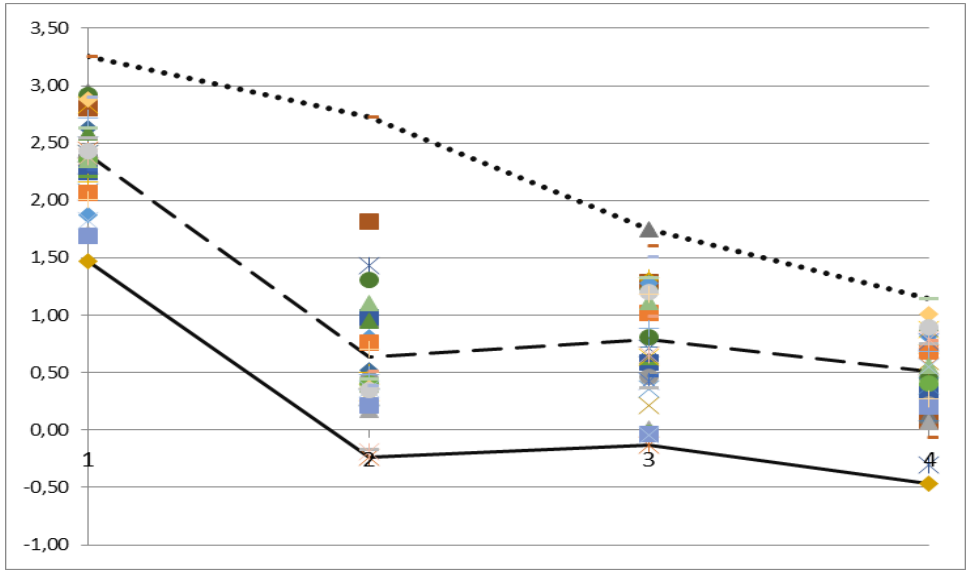
PILLAR 1.

Growth of quarterly average temperatures averaged over fifteen-year periods for stations with observation series from 1951 to 2021



(lines correspond to maximum values, minimum values, average values)

A noticeable increase in temperature occurred in the first half of the year.

We should take this increase in temperature into account when developing adaptation measures in the agricultural sector.

	I Quarte	II Quarter	III Quarter	IV Quarter
Akbaytal	2.63	0.52	0.61	0.67
Jaslyk	2.81	1.82	1.29	0.07
Karakalpakstan	2.95	1.09	1.75	0.13
Kattakurgan	2.41	0.29	0.22	0.60
Kungrat	2.30	1.44	0.72	-0.30
Chimbay	2.92	1.31	0.81	0.46
Nulus	2.56	1.00	0.72	0.08
Muynak	3.26	2.73	1.60	-0.06
Tamdy	2.39	0.91	0.64	0.73
Buzaubay	1.47	0.96	1.31	-0.47
Jankeldi	2.24	0.98	0.58	0.32
Samarqand	2.59	0.95	1.29	0.94
Guzar	2.08	0.28	0.36	0.39
Dehkanabad	2.44	-0.24	-0.13	0.56
Shakhrisabz	2.35	0.45	0.47	0.22
Shurchi	2.16	0.50	1.33	0.74
Sherabad	2.27	0.42	0.47	0.39
Baysun	2.21	0.34	0.58	0.39
Denay	1.87	0.80	1.28	0.82
Termez	2.07	0.76	1.02	0.68
Mingshukur	1.71	0.17	0.02	0.07
Jizzakh	2.83	0.33	0.64	0.88
Gallaaral	2.41	0.29	0.42	0.77
Sanzar	2.36	0.40	-0.02	0.41
Tashkent	2.72	0.48	0.88	0.68
Tuyabugiz	2.90	0.51	1.00	0.78
Kokaral	2.55	-0.17	0.37	0.75
Dalverzin	2.88	0.37	1.20	1.01
Pskem	1.69	0.21	-0.03	0.20
Dukent	2.36	1.10	1.11	0.56
Oigaing	1.82	0.36	-0.05	0.55
Kokand	2.38	-0.18	0.65	0.79
Ferghana	2.43	0.35	1.20	0.89
Andijan	2.01	0.71	1.19	0.27
Namangan	2.90	0.38	1.51	1.14
Pap	2.63	0.45	1.33	1.14
Max	3.26	2.73	1.75	1.14
Average	2.40	0.64	0.79	0.51
Min	1.47	-0.24	-0.13	-0.47

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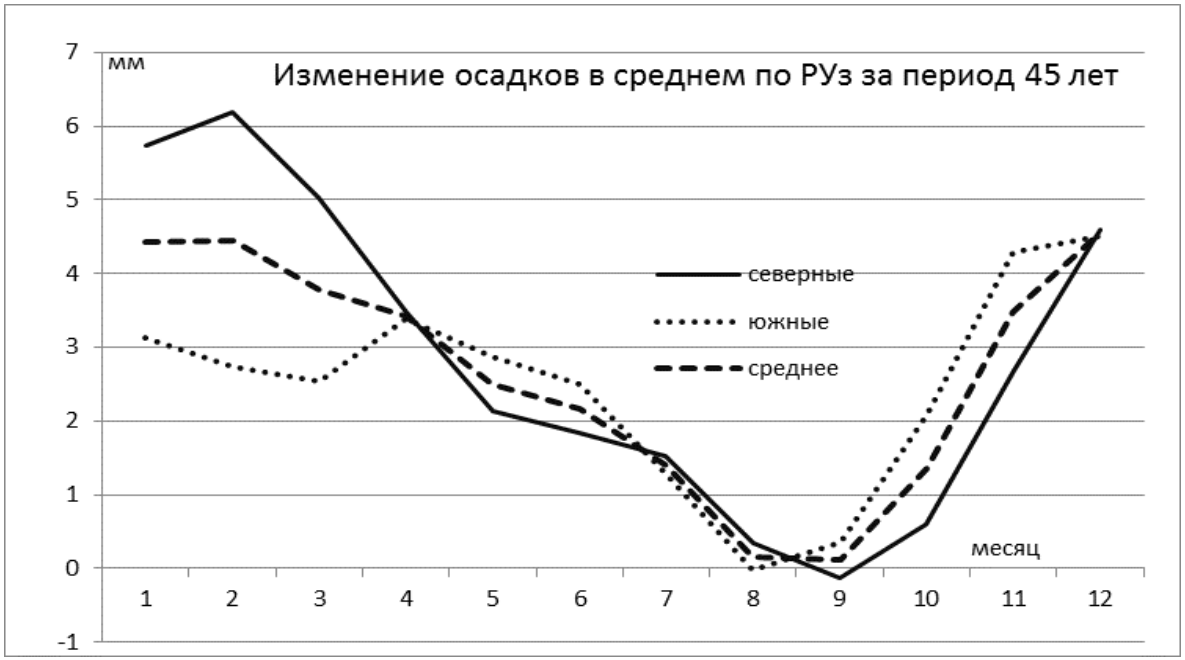
PILLAR 1.

Changes in quarterly precipitation (mm) over the past 45 years



Almost 10% increase in precipitation can be considered as an index that will determine how much of the increase or decrease in river flow is because of changes in precipitation, and how much of the river flow can be because of the melting of glaciers, which occurs because of an increase in air temperatures.

	I quart	II quart	III quart	IV quart
Jaslyk	9	0	2	2
Karkalpakiya	15	3	-3	-4
Chimbay	6	12	2	7
Kungrad	10	-11	3	7
Nukus	-1	-8	2	0
Muynak	0	-7	-2	-19
Urganch	22	9	0	4
Khiva	-4	1	-7	-11
Akbaytal	10	6	-2	-1
Tamdy	-9	-6	-3	1
Bazardjuy	-14	-13	-2	-7
Djankeldi	3	-7	1	5
Samarkand	6	6	-4	17
Kattakurgan	5	11	1	12
Navoi	-15	7	1	0
Nurata sovkhoz	13	6	-1	-2
Bukhara	-10	-4	-1	-6
Karakul	-6	0	2	0
Karshi	68	28	0	41
Guzar	-13	-4	-1	4
Dakhkanabad	10	5	-1	25
Shakrisabz	-22	11	-2	16
Shurchi-post	4	34	1	22
Sherabad	4	12	0	13
Baysun	-4	11	0	28
Termez	-4	3	0	26
Mingshukur	-10	12	3	40
Jizzakh	15	28	-1	24
Gallaaral	12	21	0	10
Bogorniy	20	26	-2	19
Sanzar	-3	10	3	6
Tshkent	19	20	-5	18
Tuyabuguz	41	24	1	31
Kokaral	32	27	1	20
Kayunchi	18	10	2	-2
Dalvarzin	8	4	-1	13
Sirdarya	19	9	1	9
Pskem	90	7	18	22
Dukent	51	8	16	45
Ongaing	64	-1	13	30
Kokand	4	13	-2	15
Ferghana	-3	12	5	16
Fedchenko	6	15	-2	20
Andijan	-1	6	2	11
Namangan	5	13	3	21
Pap	0	7	1	18
Max	90	34	18	45
Average	10	8	1	12
Min	-22	-13	-7	-19

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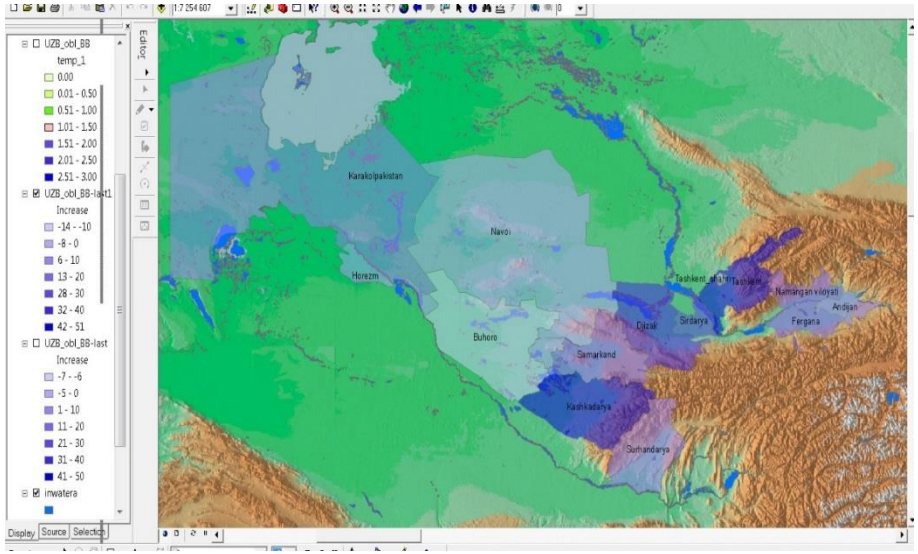
PILLAR 1. Changes in climatic parameters

Changes in the precipitation for half a year over the past 45 years by region

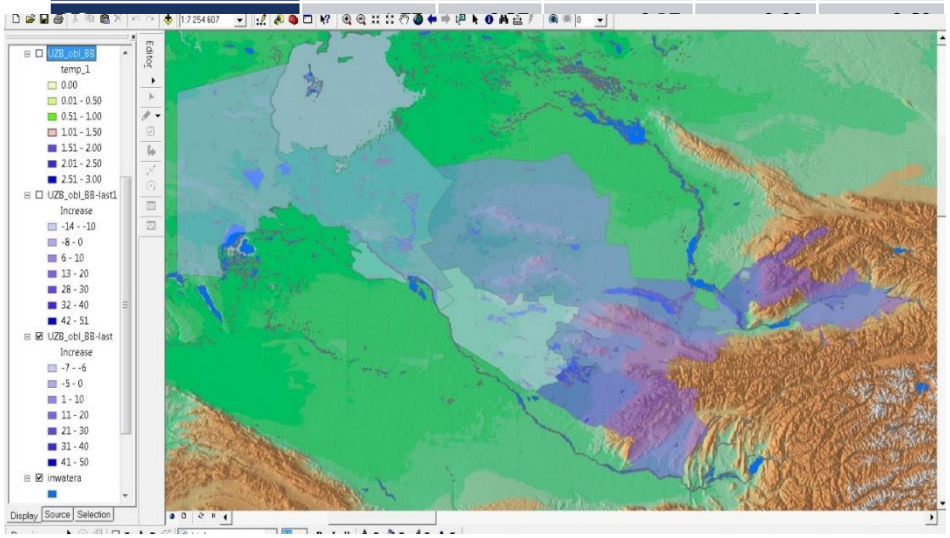
	Increase in mm for half a year	
	1-half of the year	2-half of the year
KKR	7.09	-1.02
Khorezm	-5.81	-7.54
Samarqand	13.85	13.06
Navoi	-8.22	0.76
Bukhara	-14.10	-6.60
Surkhandarya	8.37	19.93
Sirdarya	28.13	10.22
Tashkent	51.86	22.94
Jizzakh	32.24	16.11
Kashkadarya	42.49	27.58
Ferghana	13.29	16.78
Andijan	5.78	16.19
Namangan	18.21	24.04

Temperature changes over the past 45 years by regions

	1qv.	2qv.	3qv.	4qv.	Annual average
KKR	2.41	1.01	1.16	0.88	1.37
Bukhara	1.89	0.84	1.02	0.74	1.12
Ferghana	2.39	0.45	1.24	0.74	1.20
Surkhandarya	2.16	0.53	0.43	0.31	0.86
Kashkadarya	1.77	0.84	1.22	0.34	1.04
Jizzakh	2.77	0.52	0.65	0.64	1.15
Samarqand	2.41	1.01	1.16	0.88	1.37
Navoi	1.95	0.40	0.27	0.32	0.73
Andijan	1.86	0.82	1.19	0.00	0.97
Namangan	2.90	0.37	1.44	1.00	1.43
Tashkent	2.87	0.66	1.01	0.56	1.27
Khorezm	2.93	1.48	0.99	0.23	1.41
Sirdarya	2.83	0.52	1.23	0.89	1.37
MAX	2.93	1.48	1.44	1.00	1.71

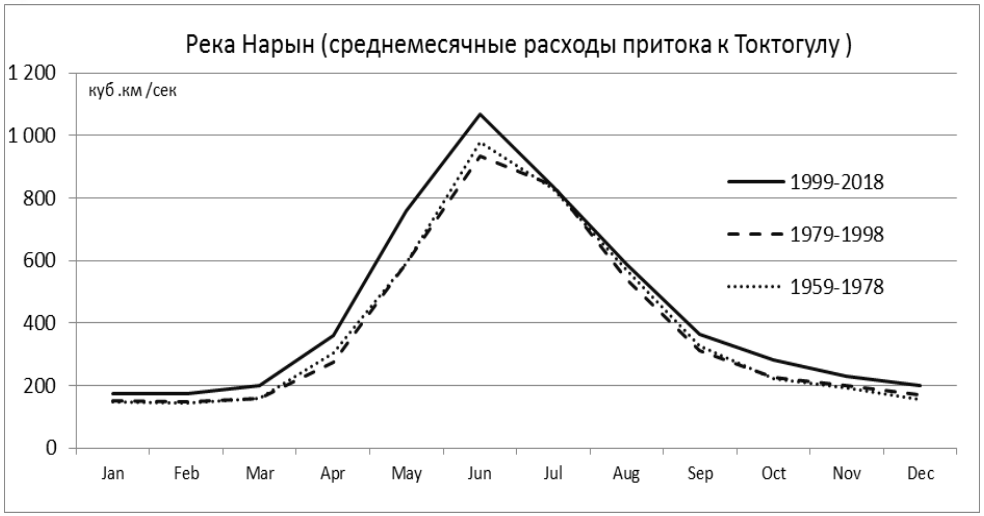


Changes in precipitation for first half a year over the past 45 years

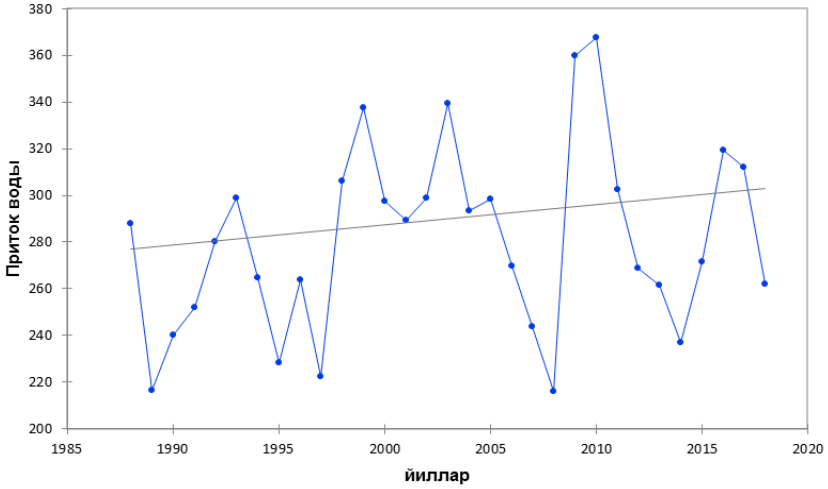


Changes in precipitation for second half a year over the past 45 years

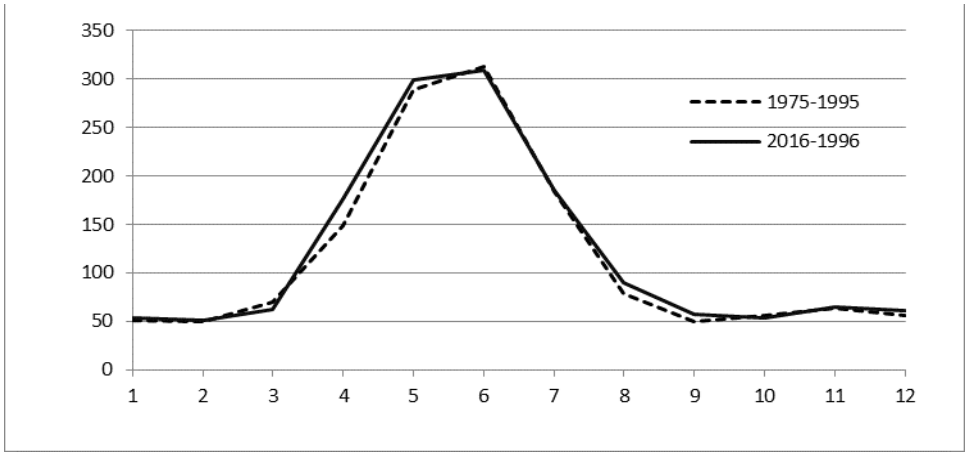
PILLAR 2. Changes in the water conditions of major rivers



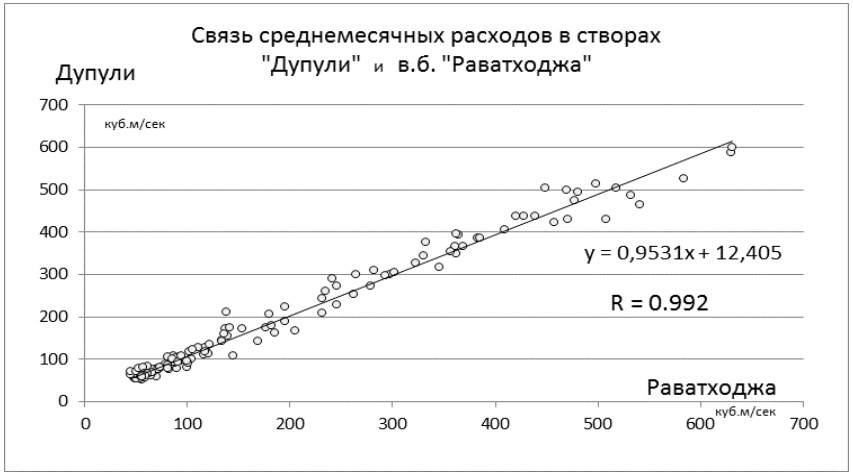
Averaged hydrographs for consecutive periods of 20 years (hydrographs presented in the average monthly water runoff)



Average monthly inflow of water to the Toktogul reservoir over a period of 30 years (results of the Mann-Kendall test)



Averaged hydrographs of the Karadarya river for the inflow to the Andijan reservoir



Relationship of average monthly runoffs in the "Dupuli" and "Ravatkhoja" stations

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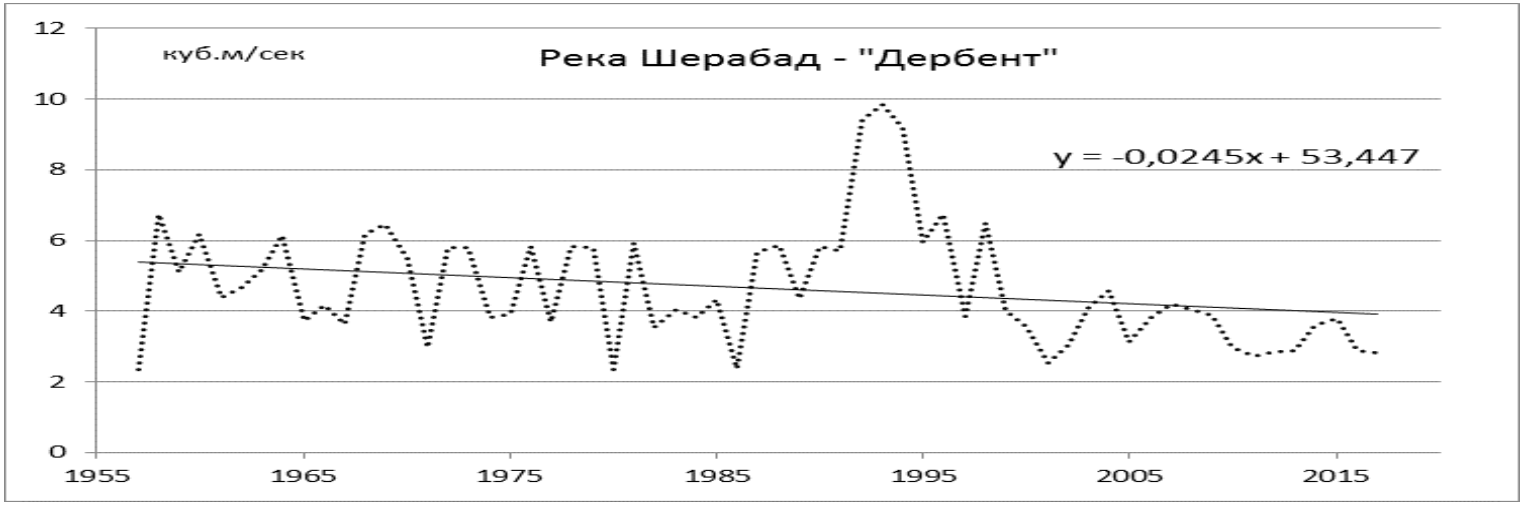
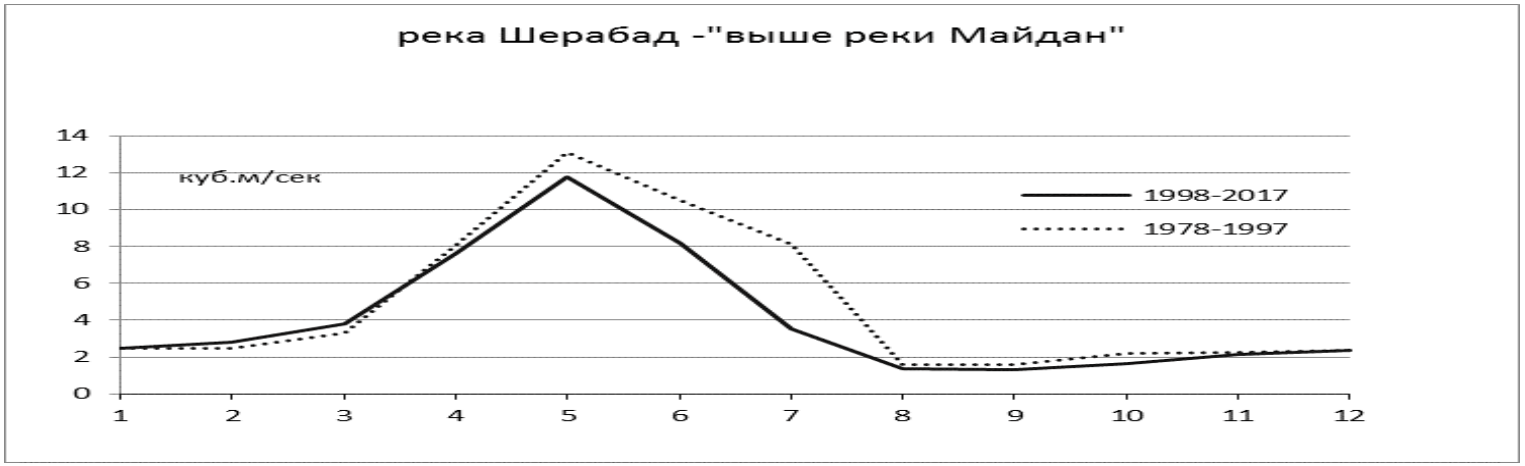
PILLAR 2. Changes in the water conditions of small rivers basins



Sherabad river, Derbent post



Sherabad river, post at beginning of the Maidan river

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PILLAR 2. Impact of CCh on Irrigated Agriculture

1. This study are carried out in different regions of the country (Fergana Volley, Karshi steppe..).
2. Objectives of the study include:
   - to assess the climate change impacts on irrigated agricultural production
   - to provide a descriptive portrayal and baseline data of the agricultural producers in the selected regions of irrigated agriculture in regard to their:
     - knowledge,
     - attitudes and practices related to Climate change and its impact on agricultural production conditions.

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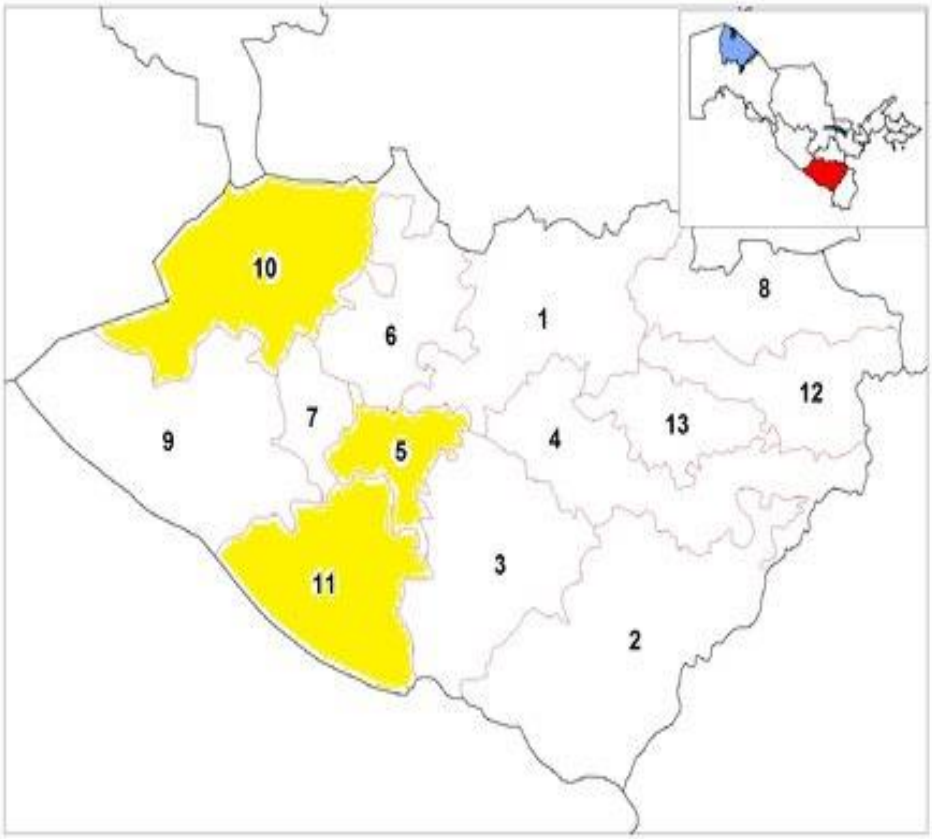
PILLAR 2. Research methods

Three districts of Kashkadarya region were selected based on specific natural and economic conditions, specialization, geographical location and water supply. The selected regions include Karshi, Mubarek and Nishan district



№	District	Main specialization	Additional specializations
1	**Karshi**	Cotton/wheat-21 Orchards - 1	Dehkan farms - 2; Orchards - 1; Livestock - 4; Others - 3
2	**Mubarek**	Cotton/wheat-22 Orchards - 1	Livestock - 5; Household yeard-1 Others - 3
3	**Nishan**	Cotton/wheat-15 Orchards - 2; Livestock - 3; Other - 1	Cotton -wheat - 3; Dehkan farms - 5; Orchards - 2; Livestock - 2; Others-4

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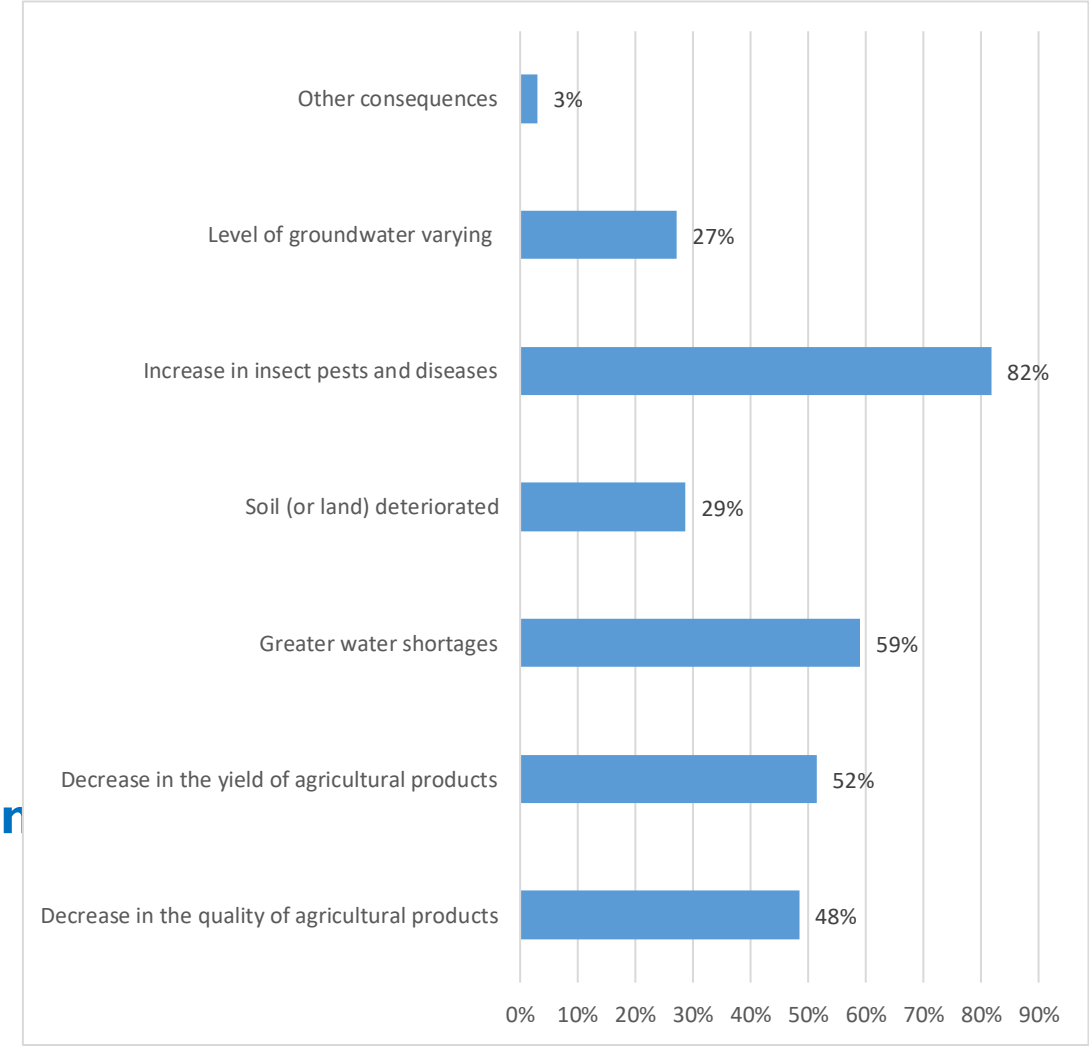
PILLAR 2. RESULTS and DISCUSSIONS

- **97% of respondents indicated negative impact of climate change on agricultural productivity:**
- **81.8% shown - increase in pests and plant diseases.**
- **59.1% shown - water shortages**
- **51.7%, shown decrease in agricultural productivity**
- **48.5% shown deterioration of agricultural products**



Consequences of climate change impacts on agriculture

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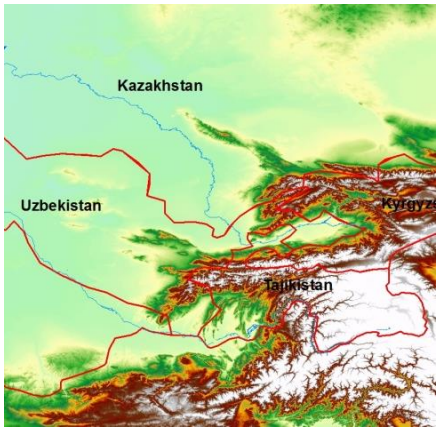
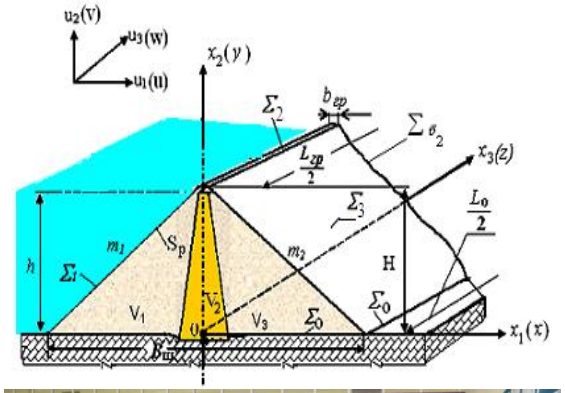
PILLAR 3. Integrating scientific knowledge into policy dialogue





- **Innovative Technology Development and Introduction**
- **Capacity Building – Adaptation** (research, human, technological and institutional)
- **Part of Parliament Expert Groups** – initiating and discussing policy developments based on scientific knowledge (Water law, policy briefs…).

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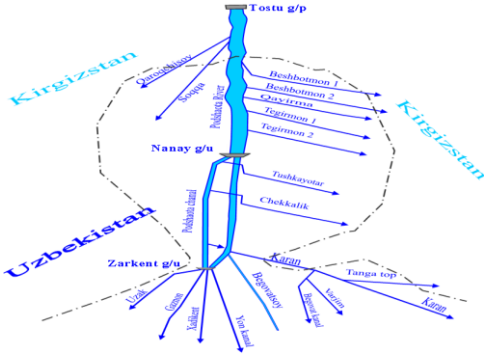
PILLAR 3. Integrating scientific knowledge into policy dialogue



- **Part of International, Regional and Bilateral Commissions and Working Gropes**:
  - Internarial and Regional Science and Academic Commissions and Communities
  - International, Regional and bilateral working groups
- **Part of National and regional working groups and commissions**
  - Intersectoral commissions
  - Sectoral commissions

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Conclusions

1. More reliable assessment results and improved water management is one of the main adaptation mechanisms to the impact of climate change on water resources potentials.
2. The strongest tendency to increase the surface temperature of the atmosphere observed in the first quarter of the year.
3. In annual terms, the amount of annual precipitation has increased by about 10% over the past 45 years. Most of this increase occurred in the first quarter of the year.
4. The water resources of the large rivers have increased because of the degradation of glaciers. The water conditions of small river basins have noticeably worsened (Surkhandarya and Kashkadarya). The water variability on these rivers has increased and is moving from snow-fed to rain-fed type.
5. Climate change characterizes by zonal and intra-annual trends. Linking climate change trends to administrative divisions allows developing effective adaptation measures to combat the negative effects.

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CONCLUSIONS

6. **97% of Agricultural producers believe that they** directly experience and **suffer from the negative effects of climate change**.
7. The most important consequences of climate change impact on agriculture are:
   - Increased water shortages;
   - Increasing the number of agricultural pests and diseases;
   - Decrease in income due to the increase in the number of insect pests;
   - Destruction of useful insects;
   - Decrease in crop yield and quality;
   - Unstable and inclement weather;
8. Adaptation measures to mitigate these impacts increased expenses of agricultural producers and increasing production costs.
9. Effective mechanisms to adapt in agriculture includes preferential loans, advanced water-saving irrigation technologies and Pest control methods.
10. Following needs were identified:
    - Special seminars, trainings and workshops for agricultural producers to improve their knowledge and skills on adaptation to climate change
    - Wider and more accurate information on climate change
    - Wider information on advanced technologies in agriculture

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THANK YOU
for YOUR ATTENTION