

Executive Committee International Fund for saving the Aral Sea

ARAL SEA BEAM (BASIN ECONOMIC ALLOCATION MODEL)

USER'S MANUAL





November 2012

Contents

Introduction	1
What is BEAM?	1
How to use this manual	2
Before using BEAM	3
What do you need to have in order to work with the model?	3
How to access the user interface	
How to log in	3
How to create a new scenario	4
Modifying input data and developing scenarios	7
How to modify input data and develop scenarios	
How to modify crop sales prices	
How to modify crop input factor prices	9
How to modify electricity prices	
How to modify the extent to which inter-annual carryover storage can be used or	
conserved	11
How to modify the allocation of water to the Aral Sea	
How to modify the group of "flexible" crops	13
How to introduce new reservoirs and hydropower facilities	
How to modify hydrological conditions	
How to modify demographic conditions	
How to modify the "flexibility" parameter	17
How to modify the level of investment in irrigation efficiency improvements	18
How to allow for new lands to be brought into irrigated production	19
Running the GAMS model and retrieving results	
How to run the GAMS model	20
How to retrieve results	21
Viewing and working with results	20
How to update the output Excel file with results from the GAMS model	
How is the output Excel file organized	
How to view the model schematic	
How to view assumptions used in a model scenario	22
How to view summary economic data	23
How to view summary hydropower data	
How to view summary agricultural data	
How to view agricultural data that are disaggregated by planning zone	
How to view information about reservoir operations	
How to view other information about the water balance of the basin	32
Reporting	
Which charts can be used to report on effectiveness impacts?	
Which charts can be used to report on efficiency impacts?	
Which charts can be used to report on equity impacts?	36

Introduction

This manual presents the web-based user interface for the model, named the Aral Sea BEAM (Basin Economic Water Allocation). The model has been developed by Global Water Partnership, DHI and COWI on behalf of the EC IFAS (Executive Committee of the International Fund for Saving the Aral Sea) in during a study, which was carried out from August 2011 to October 2012. The USAID provided financial support for the study in question.

In brief, the Aral Sea BEAM (henceforth: BEAM) constitutes a decision support system to investigate the welfare impacts of changes to water allocation mechanisms and water management infrastructure in the Aral Sea basin. The model is coded in the GAMS software environment. The web-based user interface allows a user to change model inputs and parameters without making changes to the underlying model code. The web-based interface generates a result file in an Excel spreadsheet format to facilitate viewing and processing of results. In this way, the model is accessible to all with access to the Internet.

What is **BEAM**?

BEAM is a computer based model that is used to simulate the water resources of the Aral Sea basin. BEAM includes hydrological elements such as inflows from mountain catchments; infrastructure elements such as reservoirs and canals; and economic elements such as hydropower facilities and irrigated farms. Water in the natural environment is simulated through simulation of flows through the river system as well through a mass balance of the Aral Sea and other terminal lakes.

BEAM belongs to a class of simulation models called river basin planning models, or water resources planning models. These models are used for optimization of reservoir operations, analysis and optimization of water allocation institutions, and long-term water supply planning. The focus of these models is on representing the essential hydrological, infrastructure, and institutional components of a water resources system. These models generally do not feature detailed representations of physical processes such as rainfall-runoff relationships, river hydraulics, or water quality, although some aspects of these processes can be included.

BEAM is different from most other river basin planning models with respect to the way in which water is allocated by the model. In most other river basin planning models, water is allocated using fixed demands and/or prioritization schemes that satisfy some water uses before others (e.g., domestic use may take priority over irrigation). In the BEAM representation, water is allocated according to economic optimization criteria. In other words, the BEAM model allocates water across time and space to different uses so that the economic value of water use is maximized. The purpose of the BEAM model is to explore whether it

Box 1 Aral Sea basin at a glance

The Aral Sea basin comprises 5 countries with a total population of a little more than 60 million over an area of 4 mllion km². The 5 countries are: Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan. They are all former Soviet republics. Also, the basin comprises parts of Afghanistan and Iraq.

A characteristic feature of the basin is that there are large differences in available water resources - from Tajikistan with an average of about 5,000 m³ available per person annually to Turkmenistan with a little less than 300 m³ available per person annually. Tajikistan and the Kyrgyz Republic include the major glaciated mountains of the basin and their upstream position is advantageous for water availability and, not least, hydropower. In contrast, Kazakhstan, Turkmenistan and Uzbekistan are in a downstream position. They are largely dependent on inflow from the two upstream countries.

Agriculture is a key component of the basin's economy and accounts for as much as 90% of its water use. However, hydropower may account for an increasing share of water use in future insofar as the upstream countries have planned various dams to increase hydropower production, such as the Rogun dam on the Vakhsh River in Tajikistan. If so, it will have some serious impacts on downstream agriculture.

Climate change is expected to have a significant impact in the basin. The countries will face warmer temperatures, a changing hydrology and more extreme weather. Water scarcity will become a major challenge.

may be possible to change existing water allocation patterns in ways that enhance overall welfare in the Aral Sea basin. The BEAM model also facilitates the estimation of the economic impact of changes to water allocation patterns on different groups within the basin, including the riparian states as well as different sectors such as irrigation and hydropower. The model further allows the user to estimate the economic impact of changes to physical infrastructure such as new reservoirs and irrigation efficiency improvements.

The BEAM simulation runs on a monthly time step for one year. The simulation period corresponds to the hydrological year used for water planning in the Aral Sea basin. This hydrological year begins on 1 October and ends on 30 September.

How to use this manual

This manual provides instructions for running BEAM and viewing results using the BEAM user interface. The BEAM user interface is accessed from the Internet. A specially designed website hosts the user interface, which consists of a web portal that is used to define scenarios, run the model, and access results. The web portal enables the user to select model input parameter values using input boxes and pull-down menus. After a scenario has been defined, the user runs the GAMS model, after which an Excel spreadsheet file containing model results is made available for download. The output Excel file contains tables and charts containing summary and detailed results. The Excel format facilitates the development of additional charts tailored to the user's needs.

To run BEAM and view results, the following steps are taken:

- 1. From the user interface, define the scenarios to be run. A scenario is a particular representation of the hydrological, infrastructure, and economic components of the river basin.
- 2. Run the GAMS model.
- 3. Retrieve the results file and view results.

This manual provides information about carrying out the above steps.

Before using **BEAM**

What do you need to have in order to work with the model?

In order to work with BEAM, the following are required:

- 1. A personal computer.
- 2. Microsoft Excel.
- 3. Access to the Internet.

How to access the user interface

The user interface is accessed through the following link: <u>http://beam.cowi.com</u>.

How to log in

The first window you will see looks as follows:

	Aral Sea BEAM (Basin Econor	mic Allocation Model)		۶
5	Please log in Email			
	Password			
	Remember me			
4	Don't have an account? Sign up here			
3	More information	The people bel The Aral Sea BEAM has been of International Fund for Saving experts from DHI, COWI and O	IIIO BEAN leveloped on behalf of the the Aral Sea (IFAS) and USAID by Clobal Water Partnership.	
	Aral Sea BEAM is provided by EC IFAS	Photos by Alfred Diebold	Questions or problems? Contact us	

Most important is that you may log in from this window. However, other services are provided.

Below all services provided are mentioned - one by one:

- 1. You will see a picture, two arrows (one to the left, one to the right) and a short text. If you click on the arrows you will arrive at another picture with another short text about the model. In all, there are three pictures and hence three short texts. Please note that whenever you find some text in blue, you may click on it, thereby activating the underlying hyperlink.
- 2. At the bottom you will find hyperlinks to the EC IFAS website, the website of Alfred Diebold named "Water Unites" and model team. If you have a question, you are most welcome to drop a mail to the model team. It will do its best to answer your question within 5 working days.

- 3. To the left of the picture there is a heading labelled "More information". Here you may download a brief and two manuals, including the current manual. They are available in English and Russian languages.
- 4. First time you want to log in, you will have to create an account. This you do by clicking the hyperlink just below the heading "Don't have an account?", filling in the form that appears and simply submitting it. Having done this you will be logged in. When filling in the form, you will be asked to provide an email address and a password (you choose the password yourself).
- 5. Next time you want to log in, you do this simply by providing your email address and password.

How to create a new scenario

When you log in for the first time you will see the below window:

C C Iocalhost:3000/users/2 Arel See REAM (Respire Ecopy)	mia Allocation Madel	☆ 👼 🖻 🗸 🚺 🌩 🧿
Aral Sea BEAM (Basin Econo	offlic Allocation Wodel)	Log out
You have 0 scena	rios	
	Create new scenario	
Results are ready for 0 scenarios	Pending results for 0 sc	create a scenario
No scenarios	No scenarios	Use the "Create new scenario" button to create a scenario. Adjust the parameters as you want them and then click save.
		Run the scenario
		Once you have created or modified your scenario you can run it by clicking "Run".
		Notice Running the scenario will take some time. Once you click "Run" the scenario will run in the
		background. Wait a bit of time and then reload th page (CTRL+R on Windows, CMD+R on Mac)
		Download the results
		When a scenario is finished a "Download link " appears. Here you can download the output files from the scenario.
		Modify your scenario
		You can modify the parameters of your scenarios. Running a modified scenario will overwrite the results of the old scenario.

You create your first scenario by clicking on the blue button labeled "Create new scenario".

Having done this the window below will appear:

ral Sea BEA	M (Basin Ec	ies/new	on Model)			📩 🛃 🗕 🖌 🚺	Log out
Vial Sea DEP	IVI (DASITI ECO	Shomic Allocati	on Model)				Log out
Create a r	new scena	rio					
Scenario name						Save scenario Back	
Crop prices (US	SD/ton)	Electricity price	(USD/MWb)	Nature extra	(mm3/year)	Runoff base year	
Cotton	1000.0	October	55.0	Aral north	1000.0	Normal (2008/2009)	÷.
Wheat	300.0	November	60.0	Aral south	3000.0	Demography	
Rice	500.0 🕄	December	65.0	Flexible cro	ps	Baseline (2009)	*
Alfalfa	100.0 🕄	January	70.0 🕄	Cotton		Flexible crop flexibility	
Vegetables	40.0 🕄	February	65.0	Wheat		Medium	\$
Fruit	450.0	March	60.0	Rice		Irrigation investments	
Others	75.0	April	50.0	Alfalfa	⊠	Efficiency % improvement	0.0 🗘
Input prices (%	of baseline)	May	40.0 🕄	New reservo	oirs in use	Area cost (USD/ha)	0.0
Labor	100.0 🕄	June	30.0 🗘	Rogun		Volumetric cost	0.0
Capital	100.0 🗘	July	30.0 🗘	Kambarata		(USD/1000m3)	5.0
Others	100.0 🗘	August	40.0 🗘	Yavan		Use or conserve inter-a reservoir storage (% of	
Allow extra lan	d (%)	September	50.0 🗘			Scenario	0.0
Extra land	0.0						

Briefly speaking, you give your scenario a name, make choices in the window and click "Save scenario".

You will then come back to the window providing an overview of the scenarios you have created. The window you will see looks as follows, if the scenario name chosen is "Dry year":



You may then create yet another scenario or run the scenario "Dry year". If you want to run the scenario "Dry year" and afterwards download and watch the results you do the following:

- You click the button "Run". Then the underlying GAMS model is running. When it is running the label "Click to run the scenario" will change into "Scenario is running". After a couple of minutes the results should be ready. Then you will have to reload (or refresh) the page. If you do so and the results are ready, the label "Scenario is running" will change into "These are the latest results".
- 2. Having done this, the scenario will appear to the left in the window. Here you may download the results simply by clicking the hyperlink labelled "Download results". A zip file containing scenario results will then be downloaded to your computer. You may also re-run the scenario, edit it or delete it.

At any time it is possible to modify (or edit) a scenario. Likewise, it is possible to delete a scenario. Please note that whenever you delete a scenario you also delete accompanying results.

There is no limit for the number of scenarios.

In the remaining sections of this manual we will look at modifying input data and developing scenarios, viewing and working with results – and reporting.

Modifying input data and developing scenarios

How to modify input data and develop scenarios

The user interface is used to modify input data and develop scenarios. A scenario is set of model assumptions defined by the user for the purpose of investigating how these assumptions might affect water use and welfare in the basin. It is possible to modify the following types of assumptions in BEAM:

- 1. Crop sales prices.
- 2. Crop input factor prices.
- 3. An option to bring new irrigated lands into production.
- 4. Electricity prices.
- 5. Allocation of water to the Aral Sea.
- 6. Types of crops for which cropping patterns may change from the baseline (flexible crops).
- 7. New reservoirs and hydropower facilities.
- 8. Hydrological conditions.
- 9. Demographic conditions (which affect domestic and industrial water demands).
- 10. Flexibility parameter regarding flexible crops.
- 11. The level of investment in irrigation efficiency improvements.
- 12. The extent to which inter-annual carryover storage can be used or conserved in a given year.

Any combination of the types of assumptions listed above may be used to define a scenario.

How to modify crop sales prices

Crop sales prices are modified using the following step.

1. Define or modify crop prices for all active crops in the model by changing the prices listed in the section with the heading "Crop prices". All prices must be given in units of USD/ton.

		ies/new				☆ 🛃 🖊 🗸	
Aral Sea BEA	.M (Basin Eco	onomic Allocati	on Model)				Log o
Create a r	new scena	rio					
Scenario name						Save scenario Ba	ick
Crop prices (US	iD/ton)	Electricity price	(USD/MWh)	Nature extra	(mm3/year)	Runoff base year	
Cotton	1000.0 🗘	October	55.0 🗘	Aral north	1000.0 🗘	Normal (2008/2009)	
Wheat	300.0 🗘	November	60.0 🗘	Aral south	3000.0 🕄	Demography	
Rice	500.0 🗘	December	65.0 🛟	Flexible cro	ps	Baseline (2009)	
Alfalfa	100.0	January	70.0	Cotton		Flexible crop flexib	-
Vegetables	40.0 🕄	February	65.0	Wheat		Medium	
Fruit	450.0	March	60.0	Rice		Irrigation investme	nts
				Alfalfa		Efficiency %	0.0
Others	75.0 🗘	April	50.0 🗘	New reservo	irs in use	improvement	
Input prices (%	of baseline)	May	40.0 🗘	Dashtijum		Area cost (USD/ha)	0.0
Labor	100.0 🗘	June	30.0 🗘	Rogun		Volumetric cost	0.0 (
Capital	100.0 🗘	July	30.0 🗘	Kambarata		(USD/1000m3)	0.0 (
Others	100.0 🗘	August	40.0 🕄	Yavan		Use or conserve int	
Allow extra land	1 (%)	September	50.0 🗘	ravan	2	reservoir storage (%	0.0 (
Extra land	0.0		0			Scenano	0.0
	0.0 💌						

8

How to modify crop input factor prices

It is possible to modify the prices of inputs to crop production including labor, capital, and a third aggregate input called "Others" that includes non-capital factors such as fertilizer, seeds, fuel, and pesticides. Crop input factor prices are modified using the following step.

1. Modify crop input factor prices by changing the percentage terms listed in the section "Input prices". All input factor prices are adjusted using percentage terms that relate scenario prices to baseline prices. These percentages are applied throughout the study area. It is not possible to adjust factor prices by crop type or by region.

	Ihost:3000/quer	onomic Allocatio	on Model)			☆ 🛃 🗕 🗸 🛛	Log c
			sin woodoly				209 0
Create a n	ew scena	rio					
Scenario name						Save scenario Bao	ok
Crop prices (USI	D/ton)	Electricity price	(USD/MWh)	Nature extra	ı (mm3/year)	Runoff base year	
Cotton	1000.0 🗊	October	55.0 🗘	Aral north	1000.0 🕄	Normal (2008/2009)	
Wheat	300.0 🛊	November	60.0 🗘	Aral south	3000.0 🕄	Demography	
Rice	500.0 🗘	December	65.0 🗘	Flexible cro	ps	Baseline (2009)	
Alfalfa	100.0 🕄	January	70.0	Cotton		Flexible crop flexibi	lity
Vegetables	40.0 🗘	February	65.0	Wheat		Medium	
Fruit	450.0	March	60.0	Rice		Irrigation investmen	ts
Others	75.0	April	50.0 🕄	Alfalfa	\checkmark	Efficiency % improvement	0.0
				New reserve	oirs in use	Area cost	0.0
Input prices (% o		May	40.0 🕄	Dashtijum		(USD/ha)	0.0
Labor	100.0 🗊	June	30.0 🗊	Rogun		Volumetric cost	0.0
Capital	100.0 🛊	July	30.0 🗊	Kambarata		(USD/1000m3)	
Others	100.0 🕄	August	40.0 🗘	Yavan		Use or conserve inte reservoir storage (%	
Allow extra land	(%)	September	50.0 🗘			Scenario	0.0
Extra land	0.0 🗘						

How to allow for new lands to be brought into irrigated production

It is possible to allow for new lands to be brought into irrigated production. The model may then increase the total irrigated area in one or more planning zones if this is economically optimal. If the user exercises this option, then total irrigated area of all planning zones is increased by a user-specified percentage (relative to the observed baseline). It is not possible to use different percentages in different planning zones. If the irrigated area increases, only crops selected as "flexible" crops can expand to fill the newly irrigated area. To allow for new irrigated lands to be brought into production:

1. Enter the percentage increase to be allowed in the cell labelled "Extra land" in the section "Allow extra land".

Arol Coo DE	M (Paoin For	pomio Allogati					
Arai Sea Bea	aivi (Basin Eco	onomic Allocatio	on Model)				Log
Create a	new scena	rio					
Scenario name						Save scenario B	lack
Crop prices (U	SD/ton)	Electricity price	(USD/MWh)	Nature extra	a (mm3/year)	Runoff base year	
Cotton	1000.0 🗘	October	55.0 🗘	Aral north	1000.0 🗊	Normal (2008/2009)	
Wheat	300.0 🛟	November	60.0 🗘	Aral south	3000.0 🕄	Demography	
Rice	500.0 🛟	December	65.0 🛟	Flexible cro	ps	Baseline (2009)	
Alfalfa	100.0	January	70.0	Cotton	✓	Flexible crop flexi	bility
Vegetables	40.0 🕄	February	65.0 🕄	Wheat		Medium	
Fruit	450.0	March	60.0	Rice	V	Irrigation investme	ents
Others	75.0	April	50.0	Alfalfa	⊠	Efficiency % improvement	0.0
			40.0	New reserve	oirs in use	Area cost	0.0
Input prices (%		May		Dashtijum		(USD/ha)	0.0
Labor	100.0 🗘	June	30.0 🗘	Rogun		Volumetric cost	0.0
Capital	100.0 🕄	July	30.0 🗘	Kambarata		(USD/1000m3)	
Others	100.0 🗘	August	40.0 🗘	Yavan		Use or conserve in reservoir storage (
Allow extra lan	d (%)	September	50.0 🗘			Scenario	0.0
Extra land	0.0 🗊						

How to modify electricity prices

Electricity prices affect the value of hydropower production and therefore have an impact on the amount of water released through hydropower facilities. Electricity prices vary by month but not by location (i.e., it is assumed that prices change in response to seasonal demand changes, but that prices reflect the cost of importing alternative power supplies on a common system in the region). To modify electricity prices:

1. Modify prices given in the section "Electricity price". Prices should be given in units of USD/MWh.

	alhost:3000/queri					☆ 🛃 📒 🖌 🛛	⊻ ¥ U
aral Sea BEA	.M (Basin Ecc	onomic Allocatio	on Model)				Log out
Create a r	iew scena	rio					
Scenario name						Save scenario Bao	ok.
Crop prices (US	D/ton)	Electricity price	(USD/MWh)	Nature extra	(mm3/year)	Runoff base year	
Cotton	(1)	October	55.0 🕄	Aral north	1000.0 🗊	Normal (2008/2009)	\$
Wheat		November	60.0 🗘	Aral south	3000.0 🗘	Demography	
Rice	500.0 🗘	December	65.0 🗘	Flexible crop	os	Baseline (2009)	\$
Alfalfa	100.0 🕄	January	70.0 🕄	Cotton		Flexible crop flexibi	-
Vegetables	40.0 🕄	February	65.0	Wheat		Medium	\$
Fruit	450.0	March	60.0	Rice		Irrigation investmen	ts
	0			Alfalfa		Efficiency %	0.0 🗘
Others	75.0 🗘	April	50.0	New reservo	irs in use	improvement	
Input prices (%	of baseline)	Мау	40.0 🕄	Dashtijum		Area cost (USD/ha)	0.0 🗘
Labor	100.0	June	30.0 🗘	Rogun		Volumetric cost	0.0
Capital	100.0 🗘	July	30.0 🗘	Kambarata		(USD/1000m3)	0.0
Others	100.0 🗘	August	40.0 🗘	Yavan		Use or conserve intereservoir storage (%	
Allow extra land	1 (%)	September	50.0 🗘	. a carr		Scenario	0.0
Extra land	0.0 🗘						0
	0.0						

How to modify the allocation of water to the Aral Sea

When water is allocated according to economic optimization criteria, the allocation is constrained so that flows will reach the Aral Sea (i.e., Aral Sea demands must be satisfied before water can be allocated to other uses). The Aral Sea is divided into northern and southern parts because of the dike that has been built to conserve the northern portion of the sea. It is possible to increase the amount of water reaching each sea in order to investigate the economic impact of reserving more water for the Aral Sea. The baseline quantities allocated to the Aral Sea depend on the hydrological conditions selected for the scenario. If "Normal (2008-2009)" conditions are selected under ""Runoff base year" (see below), then 8 km³/year are reserved for the South Aral Sea and 4 km³/year are reserved for the North Aral Sea. If "Dry (2000-2001)" conditions are selected, then only 2 km³/year are reserved for the South Aral Sea and 1.5 km³/year are reserved for the North Aral Sea. The annual requirement is distributed through the months of the year so that some flow must reach each sea in every month. The amount of water reaching either of the seas can be increased using the following step:

1. Specify the increase in the annual water requirement by modifying the numbers in the cells in the section with the heading "Nature extra". The units must be in mm³/year.



How to modify the group of flexible crops

The group of flexible crops is a group of crops for which cropping patterns are allowed to change from the baseline in response to water availability and other economic factors when running the GAMS model. The group of flexible crops can include any combination of cotton, wheat, rice, and alfalfa (see also below under "How to modify the flexibility parameter"). The group of flexible crops is modified using the following step:

1. Simply tick in the crops you wan to define as flexible crops. The crops you have ticked in then belong to the group of flexible crops.

	alhost:3000/queri	les/new				📩 🗟 📮 🗸 🛚	
ral Sea BEA	M (Basin Ecc	onomic Allocatio	on Model)				Log out
create a r	new scena	rio					
Scenario name						Save scenario Bac	:k
Crop prices (US	D/ton)	Electricity price	(USD/MWh)	Nature extra	(mm3/year)	Runoff base year	
Cotton	1000.0 🗘	October	55.0 🌒	Aral north	1000.0 🗘	Normal (2008/2009)	\$
Wheat	300.0 🗘	November	60.0 🗘	Aral south	3000.0 🕄	Demography	
Rice	500.0 🛟	December	65.0 🗘	Flexible cro	ps	Baseline (2009)	\$
Alfalfa	100.0 🕄	January		Cotton	\checkmark	Flexible crop flexibi	lity
/egetables	40.0	February	-(1	Wheat		Medium	\$
				Rice		Irrigation investmen	ts
Fruit	450.0	March	60.0 🕤	Alfalfa	Ø	Efficiency %	0.0
Others	75.0 🛟	April	50.0 🌒	New reservo	ire in use	improvement	
Input prices (%	of baseline)	Мау	40.0 🗘	Dashtijum		Area cost (USD/ha)	0.0 🗘
Labor	100.0 🗘	June	30.0 🗊	Rogun		Volumetric cost	
Capital	100.0 🗘	July	30.0 🗘	Ť		(USD/1000m3)	0.0
Others	100.0 🗘	August	40.0 🕄	Kambarata	_	Use or conserve inte	
		September	50.0	Yavan		reservoir storage (%	
Allow extra land		_ sptombol	0010			Scenario	0.0 🗘
Extra land	0.0 🗘						

How to introduce new reservoirs and hydropower facilities

It is possible to include proposed reservoirs and/or hydropower facilities in a scenario to estimate the impact of these facilities on basin-wide welfare. A total of four proposed projects can be included: Dashtijum, Rogun, Kambarata-1, and Yavan. To include proposed reservoirs and/or hydropower facilities:

1. Tick in the reservoirs and/or hydropower facilities you would like to include in the section under the heading "New reservoirs in use".

	calhost:3000/quer					🛃 🛃 🖌 I	
rai Sea BEA	ani (Basin Eco	onomic Allocatio	on Model)				Log out
Create a I	new scena	rio					
Scenario name						Save scenario Ba	ck
Crop prices (U	SD/ton)	Electricity price	(USD/MWh)	Nature extra	(mm3/year)	Runoff base year	
Cotton	1000.0	October	55.0 🗘	Aral north	1000.0 🗊	Normal (2008/2009)	\$
Wheat	300.0 🗘	November	60.0 🗘	Aral south	3000.0 🛟	Demography	
Rice	500.0 🗘	December	65.0 🗘	Flexible crop	os	Baseline (2009)	\$
Alfalfa	100.0 🕄	January	70.0 🗘	Cotton		Flexible crop flexib	-
Vegetables	40.0	February	65.0	Wheat		Medium	\$
Fruit	450.0	March	60.0	Rice	⊠	Irrigation investmer	its
Others	75.0	April	50.0	Alfalfa	⊠	Efficiency % improvement	0.0 🗘
	0	May	40.0	New reservo	irs in use	Area cost	0.0 🗊
Input prices (%			40.0	Dashtijum		(USD/ha)	0.0 😈
Labor	100.0	June	(1	Rogun		Volumetric cost	0.0 🗘
Capital	100.0	July		Kambarata		(USD/1000m3)	
Others	100.0 🛟	August	40.0 🕄	Yavan		Use or conserve int reservoir storage (%	
Allow extra lan	d (%)	September	50.0 🗘			Scenario	0.0 🗘
Extra land	0.0						

How to modify hydrological conditions

It is possible to use two sets of assumptions about hydrological conditions in BEAM. The first assumes that inflows to the river system from mountain catchments are the same as those observed during the 2009 hydrological year. A hydrological ear runs from 1 October Year X to 30 September Year x+1. Hence, the 2009 hydrological year runs from 1 October 2008 to 30 September 2009. The 2009 year was considered an average or normal year in the basin. The second set of assumptions assumes that inflows to the river system from mountain catchments are the same as those observed during the 2001 hydrological year. The 2001 hydrological year runs from 1 October 2000 to 30 September 2001. The 2001 year was considered a dry year in the basin. To modify hydrological conditions:

- 😝 🕙 🜔 📋 Aral Sea BEAM ← → C □ localhost:3000/queries/new 52 😹 兽 🗸 🛐 🌣 🧿 Ξ Aral Sea BEAM (Basin Economic Allocation Model) Create a new scenario Scenario name Save sce Back Crop prices (USD/ton) Electricity price (USD/MWh) Nature extra (mm3/year **Runoff base year** Cotton 1000.0 October 55.0 Aral north Normal (2008/2009) ¢ Demography Wheat 300.0 🗊 November 60.0 🗘 Aral south Baseline (2009) \$ Flexible crops Rice 500.0 December 65.0 \checkmark Flexible crop flexibility Cotton 100.0 🕄 70.0 🕄 Alfalfa January \$ Medium \checkmark Wheat 65.0 🕄 Vegetables 40.0 February \checkmark Irrigation investments Rice 450.0 60.0 Fruit March Efficiency % 0.0 ☑ Alfalfa 75.0 50.0 improvement Others April New reservoirs in use 0.0 40.0 Area cost May Input prices (% of baseline) Dashtijum (USD/ha) 30.0 Labor 100.0 June Rogun Volumetric cost 0.0 100.0 🗊 (USD/1000m3) Capital July 30.0 🕄 Kambarata Use or conserve inter-annual Others 100.0 🕄 40.0 🕄 August Yavan reservoir storage (% of max) 50.0 September Allow extra land (%) Scenario 0.0 Extra land 0.0 Aral Sea BEAM in brief User's Manual Programmer's Manual Questions or problems? Contact us
- 1. Select a hydrological year using the drop-down menu in the section "Runoff base year".

How to modify demographic conditions

Demographic conditions are assumed to control domestic and industrial water use in the model. Domestic and industrial water uses are implemented in BEAM as constraints (i.e., these water uses must be satisfied before water can be allocated to other uses). It is assumed that domestic and industrial water use will vary with population. It is possible to select three levels of demographic conditions: population levels observed during the 2009 base year; projections for the year 2020; and projections for the year 2050. To modify demographic conditions:

1. Select a set of demographic conditions using the drop-down menu in the section "Demography".

vral Sea BEAN	∕I (Basin Eco	onomic Allocatio	on Model)				Log out
Create a n	ew scena	rio					
Scenario name						Save scenario Back	:
Crop prices (USE)/ton)	Electricity price	(USD/MWh)	Nature extra	ı (mm3/year)	Runoff base year	
Cotton	1000.0 🕄	October	55.0 🗘	Aral north	1000.0 🗘	Normal (2008/2009)	\$
Wheat	300.0 🗘	November	60.0 🗘	Aral south	30	Demography	
Rice	500.0 🗘	December	65.0 🗘	Flexible cro	ps 1	Baseline (2009)	\$
Alfalfa	100.0 🕄	January	70.0	Cotton		Flexible crop flexibili	
Vegetables	40.0	February	65.0 🕄	Wheat		Medium	\$
Fruit	450.0	March	60.0	Rice	✓	Irrigation investments	8
Others	75.0	April	50.0	Alfalfa	⊠	Efficiency % improvement	0.0 🗘
Others	75.0 🕞			New reserve	oirs in use		
Input prices (% o		Мау	40.0 🕄	Dashtijum		Area cost (USD/ha)	0.0 🗘
Labor	100.0 🕄	June	30.0 🗘	Rogun		Volumetric cost	0.0 🗘
Capital	100.0 🛊	July	30.0 🗘	Kambarata		(USD/1000m3)	0
Others	100.0 🗊	August	40.0 🗘	Yavan		Use or conserve inter reservoir storage (%	
Allow extra land	(%)	September	50.0 🗘			Scenario	0.0
Extra land	0.0						0

How to modify the flexibility parameter

The so-called "flexibility parameter" controls the extent to which cropping patterns may change relative to an observed baseline. The model baseline consists of cropping patterns and other conditions observed in 2009. When land and water are allocated according to economic optimization criteria, the flexibility parameter controls the extent to which cropping patterns may change. The flexibility parameter is modified using the following step:

1. Modify the flexibility parameter using the drop-down menu under the heading "Flexible crop flexibility".

scena	rio					
					Save scenario Back	
	Electricity price	(USD/MWh)	Nature extra	a (mm3/year)	Runoff base year	
000.0	October	55.0 🗘	Aral north	1000.0 🗘	Normal (2008/2009)	*
300.0 🗘	November	60.0 🗘	Aral south	3000.0 🕄	Demography	
500.0 🗘	December	65.0 🕄	Flexible cro	ps	Baseline (2009)	÷
100.0	January	70.0	Cotton		Flexible crop flexibility	_
			Wheat	International de la construction de La construction de la construction de	Medium	÷
		0	Rice		Irrigation investments	
		0	Alfalfa	N	Efficiency % 0.0	٢
75.0 🛟	April	50.0 🗊	New reservo	oirs in use		
eline)	May	40.0 🗘	Dashtijum			
100.0 🗘	June	30.0 🗘	Bogun			0
100.0 🛊	July	30.0 🗘			(USD/1000m3)	•
100.0 🗘	August	40.0 🗘		_	Use or conserve inter-annu	
	September	50.0 🕄	Yavan	0		÷.,
					Scenario 0.0	1010
	000.0 (c) 300.0 (c) 500.0 (c) 100.0 (c) 40.0 (c) 450.0 (c) 450.0 (c) 100.0 (c) 100.0 (c) 100.0 (c)	000.0 (*) October 300.0 (*) November 500.0 (*) December 100.0 (*) January 40.0 (*) February 450.0 (*) March 75.0 (*) April 100.0 (*) June 100.0 (*) June 100.0 (*) July	000.0 (*) October 55.0 (*) 300.0 (*) November 60.0 (*) 500.0 (*) December 65.0 (*) 100.0 (*) January 70.0 (*) 40.0 (*) February 65.0 (*) 450.0 (*) March 60.0 (*) 75.0 (*) April 50.0 (*) eline) May 40.0 (*) 100.0 (*) June 30.0 (*) 100.0 (*) July 30.0 (*)	000.0 (a) October 55.0 (a) Aral north 300.0 (b) November 60.0 (b) Aral south 500.0 (b) December 65.0 (c) Flexible crossing 100.0 (c) January 70.0 (c) Vheat 40.0 (c) February 65.0 (c) Nice 450.0 (c) March 60.0 (c) Alfalfa 75.0 (c) April 50.0 (c) New reserve 100.0 (c) June 30.0 (c) Rogun 100.0 (c) July 30.0 (c) Kambarata 100.0 (c) August 40.0 (c) Yavan	000.0 (a) October 55.0 (b) Aral north 1000.0 (b) 300.0 (b) November 60.0 (b) Aral south 3000.0 (c) 500.0 (b) December 65.0 (b) Flexible crops Cotton Image: C	Electricity price (USD/MWh) Nature extra (mm3/year) 000.0 © October 55.0 © 300.0 © November 60.0 © 300.0 © December 65.0 © 100.0 © January 70.0 © 40.0 © February 65.0 © 450.0 © March 60.0 © 460.0 © April 50.0 © 100.0 © June 30.0 © 100.0 © June 30.0 © 100.0 © July 30.0 © 100.0 © August 40.0 © Yavan Coton Use or conserve inter-annureservoir storage (% of mark

How to modify the level of irrigation investments

It is possible to develop scenarios that simulate the impact of irrigation efficiency improvements. These scenarios assume that irrigation water use decreases in response to investment in water saving technologies. Investments in irrigation efficiency improvements may include both area-related costs and water use-related costs. Water savings and cost information are modified by the user. To modify irrigation efficiency data:

- 1. Modify the level of water savings by changing the value in the cell labelled "Efficiency % improvement" in the section with the heading "Irrigation investments". The value should be the percentage reduction in per hectare water use relative to baseline crop water use. The same percentage reduction is applied to all crop types and at all locations (i.e., it is not possible to specify percentages for different crops or locations).
- Provide the costs for the two different cost categories used (i.e., area-related costs and water use-related costs). The per hectare cost of installing and operating water saving technologies is inserted in the cell labelled "Area cost (USD/ha)". The per unit water cost of operating water saving technologies is inserted in the cell labelled "Volumetric cost (USD/1000m3)".

al Sea RFA	M (Basin Ecc	nomic Allocatio	on Model)				Log out
							Log out
rooto o n	ew scena	rio					
reale a n	lew scena	no					
cenario name						Save scenario Back	
rop prices (US	D/ton)	Electricity price	(USD/MWh)	Nature extra	(mm3/year)	Runoff base year	
Cotton	1000.0 🗊	October	55.0 🗘	Aral north	1000.0 🕄	Normal (2008/2009)	\$
Vheat	300.0 🗘	November	60.0 🗘	Aral south	3000.0 🕄	Demography	
lice	500.0 🕄	December	65.0 🛟	Flexible crop	os	Baseline (2009)	\$
lfalfa	100.0 🕄	January	70.0 🕄	Cotton		Flexible crop flexibility	
				Wheat		Medium	\$
egetables	40.0 🕄	February	65.0 🕄	Rice		Irrigation investments	
ruit	450.0 🗘	March	60.0 🗘	Alfalfa	☑ 1	Efficiency %	0.0 🗘
Others	75.0 🗘	April	50.0 🗘	New reservo	im in use	improvement	
nput prices (%	of baseline)	May	40.0 🗘	Dashtijum		Area cost	0.0 🗘
abor	100.0 🕄	June	30.0 🗘			(USD/ha)	
apital	100.0 🕄	July	30.0	Rogun	_	Volumetric cost (USD/1000m3)	0.0 🕄
)thers	100.0	August	40.0 🕄	Kambarata		Use or conserve inter-a	nnual
	100.0			Yavan		reservoir storage (% of	max)
llow extra land		September	50.0 🗘			Scenario	0.0 🗘
xtra land	0.0 🗊						

How to modify the extent to which inter-annual carryover storage can be used or conserved

BEAM runs for a time period of one year, and storage at the beginning of the simulation period is normally constrained to equal storage at the end of the simulation period; otherwise, it is possible that the optimization model would reduce end-of-period reservoir storages to unrealistic levels. However, some of the reservoirs in the Aral Sea basin were built to provide inter-annual carryover storage to supplement flows during dry years. The user can choose to use or conserve a portion of this storage by modifying the percentage share in the section with the heading "Use or conserve inter-annual reservoir storage (% of max)". The user selects the portion of reservoir storage to use or conserve as a percentage of the maximum capacity. If a negative value is entered, the end of period storage will be less than the beginning of period storage (in other words, inter-annual storage will be used). If a positive value is entered, the end of period storage (inter-annual storage will be conserve). The option to use or conserve inter-annual storage is applied to Toktogul and Nurek reservoirs only. The parameter is modified as follows:

1. Modify the inter-annual storage parameter by changing the value in the section "Use or conserve inter-annual reservoir storage (% of max)". The value should be given in units of percentage of maximum reservoir capacity.

	calhost:3000/quer					📩 🛃 🗕 🗸 🚺) 🌣 🕐
Aral Sea BEA	AM (Basin Eco	onomic Allocatio	on Model)				Log out
Create a l	new scena	rio					
Scenario name	iew Seena					Save scenario Back	:
Crop prices (U		Electricity price		Nature extra		Runoff base year	
Cotton	1000.0 🗊	October	55.0 🤤	Aral north	1000.0 🗊	Normal (2008/2009)	\$
Wheat	300.0 🗘	November	60.0 🗘	Aral south	3000.0 🗘	Demography	
Rice	500.0 🛟	December	65.0 🗘	Flexible cro	ps	Baseline (2009)	\$
Alfalfa	100.0	January	70.0	Cotton	⊠	Flexible crop flexibili	ty
Vegetables	40.0 🕄	February	65.0	Wheat	⊠	Medium	\$
				Rice	N	Irrigation investments	5
Fruit	450.0 🗘	March	60.0 🗘	Alfalfa	I	Efficiency %	0.0
Others	75.0 🗘	April	50.0 🗘	New reservo		improvement	
Input prices (%	of baseline)	May	40.0 🗘	Dashtijum		Area cost	0.0
Labor	100.0 🗊	June	30.0 🗊	,		(USD/ha)	
Capital	100.0	July	30.0	Rogun	_	Volumetric cost (USD/1000m3)	0.0
Others	100.0 🗊	August	40.0	Kambarata		Use or conserve inter	-annual
Others	100.0			Yavan		reservoir storage (%	
Allow extra lan	d (%)	September	50.0 🗘		(1	Scenario	0.0
Extra land	0.0 🗘						

Viewing and working with results

How to update the output Excel file with results from the GAMS model

The zip file containing model contains an .xls file used to display model results and a number of .csv files containing output from the GAMS model. The contents of the .csv files must be imported into the .xls file by the user. To import model output into the .xls file:

- 1. Unzip the contents of the downloaded zip file into a new directory.
- 2. Open the .xls file, which is called "beamOutput.xls".
- 3. Click on the control button "Refresh all CSV input data files" on the "frontpage" worksheet.

									1			1	
A A	B	С	D	E	F	G	н	- I	J	K	L	M	N
B	EAM - Basin	Econor	mic Allo	cation Mode									
				id Riegels, COWI A/S allowed only by pern				3	Re	fresh all C	5V input dat	afiles	
	Path to file												
3	C:\Data\AralSe	a\BEAM\we	ebtest3\										
) 0													
1		Base	Scenario										
2	Solver status	1	1										
3	Model status	2	2										
4													
3 4 5 6 7 8	Summary text												

How is the output Excel file organized

The output user interface consists of a number of worksheets that hold output from the GAMS model. These worksheets are organized into the following four groups:

- 1. The "frontpage" worksheet with the control button that is used to import GAMS model output.
- 2. A worksheet called "schematic" that holds the model schematic.
- 3. A set of worksheets with black-colored tabs holding summary output from the GAMS model.
- 4. A set of worksheets with blue-colored tabs holding direct output from the GAMS model. The data presented on the worksheets with black-colored tabs summarize data from the worksheets with blue-colored tabs. The data on the blue-colored tabs should only be accessed or altered by users familiar with the underlying GAMS model code.
- 5. A fourth group of worksheets containing information used to import data from the underlying GAMS model. The data on the fourth group of worksheets should only be accessed or altered by users familiar with the underlying GAMS model code.

How to view the model schematic

The model schematic is available on the "schematic" worksheet. The model schematic includes six types of nodes:

- 1. Water source nodes represent inflows from rim catchments.
- 2. Reservoir nodes represent reservoir and hydropower facilities. The reservoir node type includes both existing and planned reservoirs.
- 3. River nodes represent junctions where two or more upstream nodes come together and/or where two or more downstream nodes diverge.
- 4. Planning zone nodes represent consumptive water use locations.
- 5. Return flow nodes represent return flows from consumptive water use locations.
- 6. Lake nodes represent terminal lakes.

The arrows shown between nodes indicate the direction of flow. To interpret the schematic, a color scheme is used to identify different node types. To view the model schematic:

1. Navigate to the "schematic" worksheet.



How to view assumptions used in a model scenario

The output user interface always presents results from two scenarios: the baseline scenario and the scenario that was defined using the input user interface. This facilitates the comparison of scenario results to the baseline. To keep track of assumptions used in a scenario, all assumptions are recorded on the "assumptions" worksheet. To view assumptions:

1. Navigate to the "assumptions" worksheet.

Assumptions for baseline and Scenario

	Baseline	Scenario
Cotton price USD/ton	1.000	1.000
Wheat price USD/ton	300	300
Rice price USD/ton	500	500
Alfalfa price USD/ton	100	100
Vegetable price USD/ton	40	40
Fruit price USD/ton	450	450
Other crops price USD/ton	75	75
Labor price (% of baseline)	100%	100%
Capital price (% of baseline)	100%	100%
Diesel/fertilizer price (% of baseline)	100%	100%
Crop change transformation elasticity	0,50	0,50
Extra nature water need, Aral Sea North, mm3/year	0	0
Extra nature water need, Aral Sea South, mm3/year	0	0
Cotton flexible (0/1)?	Fixed	Flexible
Wheat flexible (0/1)?	Fixed	Flexible
Rice flexible (0/1)?	Fixed	Flexible
Alfalfa flexible (0/1)?	Fixed	Flexible
Rainfall year	2009	2009
Modelled years	2009	2009
Irrigation efficiency investment USD/ha	0	0
Irrigation efficiency investment USD/m3	0	0
Irrigatopn efficiency improvement (%)	0%	0%
Investments in Dashtijum	0	0
Investments in Rogun	0	0
Investments in Kambarata-1	0	0
Investments in Naryn cascade	0	0
Investments in Vakhsh cascade	0	0
Investments in Yavan	0	0
Electricity price m01 USD/MWh	70	70
Electricity price m02 USD/MWh	70	70
Electricity price m03 USD/MWh	60	60
Electricity price m04 USD/MWh	50	50
Electricity price m05 USD/MWh	40	40
Electricity price m06 USD/MWh	30	30
Electricity price m07 USD/MWh	30	30
Electricity price m08 USD/MWh	40	40
Electricity price m09 USD/MWh	50	50
Electricity price m10 USD/MWh	50	50
Electricity price m11 USD/MWh	60	60
Electricity price m12 USD/MWh	65	65
Reservoir buildup	0%	0,0%
Demographic change in water use, households	0%	0%
Demographic change in water use, industry	0%	0%
Fallow land	0%	0%

How to view summary economic data

Summary economic data are available on the "economy" worksheet. Data are presented for both the baseline scenario and the user-defined scenario defined using the web interface. All data are aggregated to the basin-wide and annual levels, and are also disaggregated to national and monthly levels. The following types of summary data are presented:

- Total value added: Total value added is the sum of agricultural value added and hydropower value added. For details of how value added is estimated, the reader is referred to the BEAM programmer's manual. These tables allow the user to view the impact of a scenario on overall welfare relative to the baseline. The disaggregated data allow the user to see how the distribution of income changes with respect to geography (measured in terms of income to individual countries) and with respect to time (measured over the months of the year).
- 2. Agricultural value added: Agricultural value added is equal to agricultural production value minus agricultural input costs. These tables allow the user to view the impact of a scenario on the agriculture sector. For the agricultural sector, the distribution of value added over the months of the year is not meaningful because the monthly results presented in the table are simply equal to the annual value added divided by 12. The disaggregation to monthly data is made in this way to facilitate the presentation of monthly data in the "Total income" table.
- 3. Hydropower value added: These tables allow the user to view the impact of a scenario on the hydropower sector. These data are also disaggregated by country and by month.

Total valu	e added, baselin	,												Total Value	added, Scenaric	,	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total		Oct	Nov	
KYR	47.636	65.857	64.057	73.344	78.670	74.664	63.047	46.702	40.112	34.812	39.073	45.077	673.051	KYR	45.591	81.033	91
TAD	168.312	196.864	174.799	161.123	152.220	146.859	128.832	109.925	86.440	92.203	121.505	145.465	1.684.547	TAD	144.898	212.129	179
TUR	114.092	114.092	114.092	114.092	114.092	114.092	114.092	114.092	114.092	114.092	114.092	114.092	1.369.104	TUR	118.128	118.128	11
UZB	456.957	467.510	466.678	468.518	476.402	464.217	456.588	454.066	459.029	459.290	459.383	458.806	5.547.444	UZB	474.755	484.849	48
KAZ	41.453	42.380	42.842	43.303	43.303	42.380	41.458	40.535	39.613	39.613	40.534	41.451	498.865	KAZ	42.546	43.525	4
All	828.450	886.703	862.468	860.380	864.687	842.212	804.017	765.320	739.286	740.010	774.587	804.891	9.773.011	All	825.918	939.664	91
Agricultu	ral value added, t	baseline, 1000	USD											Agricultura	al value added, S	enario, 100	o usi
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total		Oct	Nov	
KYR	16.001	16.001	16.001	16.001	16.001	16.001	16.001	16.001	16.001	16.001	16.001	16.001	192.012	KYR	16.791	16.791	1
TAD	59.657	59.657	59.657	59.657	59.657	59.657	59.657	59.657	59.657	59.657	59.657	59.657	715.884	TAD	62.940	62.940	
TUR	114.092	114.092	114.092	114.092	114.092	114.092	114.092	114.092	114.092	114.092	114.092	114.092	1.369.104	TUR	118.128	118.128	1:
UZB	438.436	438.436	438.436	438.436	438.436	438.436	438.436	438.436	438.436	438.436	438.436	438.436	5.261.232	UZB	455.774	455.774	4
KAZ	36.845	36.845	36.845	36.845	36.845	36.845	36.845	36.845	36.845	36.845	36.845	36.845	442.140	KAZ	37.990	37.990	1
All	665.031	665.031	665.031	665.031	665.031	665.031	665.031	665.031	665.031	665.031	665.031	665.031	7.980.372	All	691.623	691.623	6
	ver value added.	have line 400	0.000											Understand	er value added.		
Tryuropov	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	nyuropow	Oct	Nov	10 0.
KYR	31.635	49.856	48.056	57.343	62,669	58.663	47.046	30,701	24.111	18.811	23.072	29.076	481.039	KYR	28.800	64.242	
TAD	108.655	137.207	115 142	101.466	92.563	87.202	69.175	50.268	26,783	32,546	61.848	85.808	968.663	TAD	81.958	149.189	1
TUR	108.055	137.207	113.142	101.400	92.505	07.202	05.175	0.208	20.785	32.340	01.048	0.000	908.003	TUR	01.538	149.109	-
UZB	18.521	29.074	28.242	30.082	37.966	25.781	18.152	15.630	20.593	20.854	20.947	20.370	286.212	UZB	18,981	29.075	
KAZ	4.608	5.535	5.997	6.458	6.458	5.535	4.613	3.690	20.353	2.768	3.689	4.606	56,725	KAZ	4,556	5.535	
All	163.419	221.672	197.437	195.349	199.656	177.181	4.615	100.289	74.255	74.979	109.556	139.860	1.792.639	All	4.550	248.041	22
ALL	103.419	221.0/2	197.437	195.549	133.020	1//.181	120.980	100.289	/4.255	/4.9/9	103.220	133.800	1./92.039	All	134.295	248.041	- 27

4. Summary data are also available for hydropower production and irrigation investment costs. In the present version of BEAM, costs of hydropower production are assumed to zero. The summary data related to irrigation efficiency investment costs present costs result from irrigation investment assumptions defined using the input interface.

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total		Oct	Nov
KYR	0	0	0	0	0	0	0	0	0	0	0	0	0	KYR	0	0
TAD	0	0	0	0	0	0	0	0	0	0	0	0	0	TAD	0	0
TUR	0	0	0	0	0	0	0	0	0	0	0	0	0	TUR	0	0
UZB	0	0	0	0	0	0	0	0	0	0	0	0	0	UZB	0	0
KAZ	0	0	0	0	0	0	0	0	0	0	0	0	0	KAZ	0	0
		0	0	0	0	0	0	0	0	0	0	0	0	All	0	0
All Irrigation et	0 ficiency investme	0	line, 1000 L	-	0		0	0				0				
	ficiency investme	ent costs, base		ISD											ficiency investment	nt costs, S
			eline, 1000 L	-	Feb	Mar	Apr	Мау	Jun	lut	Aug	Sep	Total			
	ficiency investme	ent costs, base		ISD						lut 0	Aug				ficiency investment	nt costs, S
Irrigation et	ficiency investme Oct	ent costs, base Nov	Dec	JSD Jan	Feb	Mar	Apr	Мау	Jun			Sep	Total	Irrigation eff	ficiency investmen Oct	nt costs, S Nov
Irrigation et	ficiency investme Oct	ent costs, base Nov 0	Dec	Jan 0	Feb	Mar 0	Apr 0	May 0	Jun 0		0	Sep 0	Total 0	Irrigation eff	ficiency investmen Oct	nt costs, S Nov
Irrigation et	ficiency investme Oct	ent costs, base Nov O O	Dec	Jan 0 0	Feb 0 0	Mar 0 0	Apr 0 0	May O O	Jun 0 0	0	0	Sep 0 0	Total 0 0	Irrigation eff KYR TAD	ficiency investmen Oct	nt costs, S Nov 0 0
KYR TAD TUR	ficiency investme Oct	ent costs, base Nov 0 0 0	Dec	JSD Jan O O O	Feb O O O	Mar 0 0	Apr O O O	<u>Мау</u> 0 0	Jun 0 0	0	0	Sep 0 0 0		Irrigation eff KYR TAD TUR	ficiency investmen Oct	nt costs, S Nov 0 0

4

5. Summary value added data are also available as a per cent of GDP. This provides information about the importance of agriculture and hydropower in the basin to each of the riparian countries. GDP values used to prepare the tables are 2009 PPP figures.

Fotal value	added, baseline	, % of GDP												Total value	added, Scenario,	% of GDP	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total		Oct	Nov	D
KYR	0,13%	0,13%	0,13%	0,13%	0,13%	0,13%	0,13%	0,13%	0,13%	0,13%	0,13%	0,13%	5,32%	KYR	0,36%	0,64%	0,72
TAD	0,42%	0,42%	0,42%	0,42%	0,42%	0,42%	0,42%	0,42%	0,42%	0,42%	0,42%	0,42%	11,73%	TAD	1,01%	1,48%	1,2
TUR	0,33%	0,33%	0,33%	0,33%	0,33%	0,33%	0,33%	0,33%	0,33%	0,33%	0,33%	0,33%	3,91%	TUR	0,34%	0,34%	0,34
JZB	0,53%	0,53%	0,53%	0,53%	0,53%	0,53%	0,53%	0,53%	0,53%	0,53%	0,53%	0,53%	6,76%	UZB	0,58%	0,59%	0,5
KAZ	0,02%	0,02%	0,02%	0,02%	0,02%	0,02%	0,02%	0,02%	0,02%	0,02%	0,02%	0,02%	0,26%	KAZ	0,02%	0,02%	0,0
. aniaultura	l value added, ba	voline % of (00											6 onlouitural	value added, Sce	maria % of	CDD
Agricultura	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	Agricultural	Oct	Nov	
(YR	0.13%	0.13%	0.13%	0.13%	0.13%	0.13%	0.13%	0.13%	0.13%	0.13%	0.13%	0.13%	1,52%	KYR	0.13%	0.13%	0,1
TAD	0,42%	0,42%	0,42%	0.42%	0.42%	0,42%	0,42%	0.42%	0,42%	0,42%	0,42%	0,42%	4,99%	TAD	0.44%	0.44%	0,4
TUR	0.33%	0.33%	0.33%	0.33%	0.33%	0.33%	0.33%	0.33%	0.33%	0.33%	0.33%	0.33%	3.91%	TUR	0,34%	0.34%	0.3
JZB	0,53%	0.53%	0,53%	0,53%	0.53%	0,53%	0,53%	0,53%	0,53%	0,53%	0,53%	0,53%	6.41%	UZB	0,56%	0.56%	0,5
KAZ	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.02%	0.23%	KAZ	0.02%	0.02%	0,0
	-,	-,	-,	-,	-,	-,	-,	-,	-,	-,	-,	-,			-,	-,	-,-
Hydropowe	er value added, b	oaseline, % of	GDP											Hydropowe	r value added, Sc	enario, % of	GDP
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total		Oct	Nov	[
KYR	0,25%	0,39%	0,38%	0,45%	0,50%	0,46%	0,37%	0,24%	0,19%	0,15%	0,18%	0,23%	3,81%	KYR	0,23%	0,51%	0,5
	0.76%	0,96%	0,80%	0,71%	0,64%	0,61%	0,48%	0,35%	0,19%	0,23%	0,43%	0,60%	6,75%	TAD	0,57%	1,04%	0,8
TAD							0.000/	0,00%	0.00%	0.00%	0,00%	0.00%	0.00%	TUR		0.000/	0.0
TAD FUR	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	TUR	0,00%	0,00%	0,0
		0,00% 0,04%	0,00% 0,03%	0,00% 0,04%	0,00% 0,05%	0,00% 0,03%	0,00%	0,00%	0,00%	0,00%	0,03%	0,02%	0,35%	UZB	0,00%	0,00%	0,0

6. Summary value added data are also available in per person GDP units. Each figure in the tables is equal to value added divided by per person GDP. This provides information about the importance of agriculture and hydropower in the basin to each of the riparian countries which controlling for population size.

	e added, baseline													Total valu	e added, Scenario,	•	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	_	Oct	Nov	D
KYR	20711	28633	27851	31889	34204	32463	27412	20305	17440	15136	16988	19599	292.631	KYR	19822	35232	396
TAD	88585	103613	91999	84802	80116	77294	67806	57855	45495	48528	63950	76561	886.604	TAD	76262	111647	942
TUR	17553	17553	17553	17553	17553	17553	17553	17553	17553	17553	17553	17553	210.631	TUR	18174	18174	181
UZB	157571	161210	160923	161558	164277	160075	157444	156574	158286	158376	158408	158209	1.912.912	UZB	163709	167189	1669
KAZ	3513	3592	3631	3670	3670	3592	3513	3435	3357	3357	3435	3513	42.277	KAZ	3606	3689	37
Agricultur	al value added, b	aseline, mult	iple of per o	apita GDP										Agricultur	al value added, Sc	enario, mult	tiple of
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total		Oct	Nov	0
KYR	6957	6957	6957	6957	6957	6957	6957	6957	6957	6957	6957	6957	83483	KYR	7300	7300	73
TAD	31398	31398	31398	31398	31398	31398	31398	31398	31398	31398	31398	31398	376781	TAD	33126	33126	331
TUR	17553	17553	17553	17553	17553	17553	17553	17553	17553	17553	17553	17553	210631	TUR	18174	18174	18
UZB	151185	151185	151185	151185	151185	151185	151185	151185	151185	151185	151185	151185	1814218	UZB	157163	157163	157:
KAZ	3122	3122	3122	3122	3122	3122	3122	3122	3122	3122	3122	3122	37469	KAZ	3219	3219	3
	ver value added,	have been south												1. Junior and the second	ver value added, S		Alata a
пуагороч	Oct	Nov	Dec		Feb	Mar	Apr	May	Jun	Jul	A	Sep	Total	пуагороу	Oct	Nov	incipie o
				Jan	1 1 1						Aug						
KYR	13754	21677	20894	24932	27247	25506	20455	13348	10483	8179	10031	12642	209147	KYR	12522	27931	32
TAD	57187	72214	60601	53403	48717	45896	36408	26457	14096	17129	32552	45162	509823	TAD	43136	78521	61
TUR	0	0	0	0	0	0	0	0	0	0	0	0	0	TUR	0	0	
JZB	6387	10026	9739	10373	13092	8890	6259	5390	7101	7191	7223	7024	98694	UZB	6545	10026	9
(AZ	391	469	508	547	547	469	391	313	235	235	313	390	4807	KAZ	386	469	

Charts are also available for all tables presented in this section.

5

How to view summary hydropower data

Summary hydropower data are available on the "HEPS" worksheet. The following types of summary data are presented:

1. Aggregated value added and generation data are presented at the basin and national level. The national-level aggregated data include only Kyrgyzstan and Tajikistan. The other riparian countries are not included because the overwhelming majority of hydropower production in the basin takes place in Kyrgyzstan and Tajikistan.

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Tota
Baseline	163	222	197	195	200	177	139	100	74	75	110	140	1.793
Scenario	134	248	225	231	236	194	128	108	90	113	160	154	2.02
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Tota
Baseline	32	50	48	57	63	59	47	31	24	19	23	29	48
Scenario	29	64	74	79	77	64	34	23	17	17	23	40	54
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Tota
aseline	109	137	115	101	93	87	69	50	27	33	62	86	96
enario	82	149	116	115	115	98	70	66	49	72	113	89	1.13
)	it out												
ydro power gen		Nov	Dec	lan	Feb	Mar	Apr	May	lun	lui	Aug	Sen	Tota
	Oct	Nov 2.428	Dec	Jan 1.624	Feb	Mar 1.780	Apr 1.641	May 1.434	Jun 1.587	Jul 1.506	Aug 1.525	Sep 1.531	
Baseline	Oct												20.57
Baseline	Oct 2.002	2.428	1.771	1.624	1.747	1.780	1.641	1.434	1.587	1.506	1.525	1.531	20.57 24.22
Baseline Scenario	Oct 2.002 1.420	2.428 2.868	1.771 2.192	1.624 2.028	1.747 2.103	1.780 1.963	1.641 1.419	1.434 1.443	1.587 1.722	1.506 2.496	1.525 2.742	1.531 1.824	20.57 24.22 Tota
dro power gen Baseline Scenario Baseline Scenario	Oct 2.002 1.420 Oct	2.428 2.868 Nov	1.771 2.192 Dec	1.624 2.028 Jan	1.747 2.103 Feb	1.780 1.963 Mar	1.641 1.419 Apr	1.434 1.443 May	1.587 1.722 Jun	1.506 2.496 Jul	1.525 2.742 Aug	1.531 1.824 Sep	20.57 24.22 Tota 5.73
Baseline Scenario Baseline	Oct 2.002 1.420 Oct 345	2.428 2.868 Nov 543	1.771 2.192 Dec 451	1.624 2.028 Jan 531	1.747 2.103 Feb 607	1.780 1.963 Mar 690	1.641 1.419 Apr 653	1.434 1.443 May 480	1.587 1.722 Jun 516	1.506 2.496 Jul 339	1.525 2.742 Aug 289	1.531 1.824 Sep 294	20.57 24.22 Tot: 5.73 6.41
Baseline Scenario Baseline	Oct 2.002 1.420 Oct 345 288	2.428 2.868 Nov 543 783	1.771 2.192 Dec 451 857	1.624 2.028 Jan 531 837	1.747 2.103 Feb 607 808	1.780 1.963 Mar 690 778	1.641 1.419 Apr 653 394	1.434 1.443 May 480 288	1.587 1.722 Jun 516 288	1.506 2.496 Jul 339 288	1.525 2.742 Aug 289 288	1.531 1.824 Sep 294 513	Tota 20.57 24.22 Tota 5.73 6.41 Tota 10.42

2. Hydropower generation and value added are also presented for individual reservoirs and hydropower facilities.

HydroProd	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Tota
Res_KAM	0	0	0	0	0	0	0	0	0	0	0	0	(
Res_TOK	344.701	542.930	451.328	531.190	607.272	689.720	652.921	479.535	515.703	339.020	288.792	293.519	5.736.63
Res_AND	71.686	71.085	70.468	68.674	65.444	61.583	59.470	63.352	70.247	71.871	71.672	71.860	817.41
Res_KAR	79.921	82.587	84.995	84.995	84.142	84.142	84.995	84.995	84.995	64.271	84.995	82.691	987.72
Res_CHA	144.000	198.835	148.749	144.000	256.629	144.000	144.000	144.000	410.816	426.246	272.991	147.261	2.581.52
Res_SHA	68.169	68.254	68.254	68.254	68.254	68.254	68.254	68.254	68.254	68.254	68.215	68.129	818.79
Res_ROG	0	0	0	0	0	0	0	0	0	0	0	0	
Res_NUR	1.247.250	1.358.858	841.717	620.805	559.247	626.701	592.386	527.061	341.644	447.250	667.644	787.360	8.617.92
Res_TMP	46.412	105.738	105.739	105.746	105.746	105.690	39.034	66.744	95.618	88.917	70.679	80.133	1.016.19
Res_TMR	0	0	0	0	0	0	0	0	0	0	0	0	
Res_DAS	0	0	0	0	0	0	0	0	0	0	0	0	(
Res_ZAR	0	0	0	0	0	0	0	0	0	0	0	0	
Res_NAR	0	0	0	0	0	0	0	0	0	0	0	0	
Res_FAR	0	0	0	0	0	0	0	0	0	0	0	0	
Res_VAH	0	0	0	0	0	0	0	0	0	0	0	0	
										-		-	
-	0 ue added, baseline,	0 1000 USD	0	0	0	0	0	0	0	0	0	0	
– Hydro power val			Dec	Jan	Feb	0 Mar	Apr	May	Jun	0 lut	Aug	Sep	
Res_CHI Hydro power val HydroInc Res KAM	ue added, baseline,	1000 USD											Tota
– Hydro power val Hydroinc	ue added, baseline, Oct	1000 USD Nov	Dec	Jan	Feb	Mar	Apr	Мау	Jun	lut	Aug	Sep	Tota 481.03
Hydro power val Hydroinc Res_KAM	ue added, baseline, Oct 0	1000 USD Nov 0	Dec 0	Jan 0	Feb 0	Mar 0	Apr 0	May 0	Jun 0	lut 0	Aug	Sep 0	Tota 481.03
Hydro power val Hydroinc Res_KAM Res_TOK Res_AND	ue added, baseline, Oct 0 31.635	1000 USD Nov 0 49.856	Dec 0 48.056	Jan 0 57.343	Feb 0 62.669	Mar 0 58.663	Apr 0 47.046	May 0 30.701	Jun 0 24.111	Jul 0 18.811	Aug 0 23.072	Sep 0 29.076	Tota 481.03 56.50
Hydro power val HydroInc Res_KAM Res_TOK	ue added, baseline, Oct 0 31.635 4.784	1000 USD Nov 0 49.856 5.705	Dec 0 48.056 6.140	Jan 0 57.343 6.487	Feb 0 62.669 6.261	Mar 0 58.663 5.135	Apr 0 47.046 4.174	May 0 30.701 3.494	Jun 0 24.111 2.827	Jul 0 18.811 2.876	Aug 0 23.072 3.827	Sep 0 29.076 4.793	Tota
Hydro power val Hydroinc Res_KAM Res_TOK Res_AND Res_KAR	ue added, baseline, Oct 0 31.635 4.784 5.508	1000 USD Nov 0 49.856 5.705 6.770	Dec 0 48.056 6.140 7.490	Jan 0 57.343 6.487 8.066	Feb 0 62.669 6.261 8.007	Mar 0 58.663 5.135 6.863	Apr 0 47.046 4.174 5.762	May 0 30.701 3.494 4.609	Jun 0 24.111 2.827 3.457	Jul 0 18.811 2.876 2.835	Aug 0 23.072 3.827 4.609	Sep 0 29.076 4.793 5.647	Tota 481.03 56.50 69.62
Hydro power val Hydroinc Res_KAM Res_TOK Res_AND Res_KAR Res_CHA	ue added, baseline, Oct 0 31.635 4.784 5.508 14.400	1000 USD Nov 0 49.856 5.705 6.770 20.570	Dec 0 48.056 6.140 7.490 19.029	Jan 0 57.343 6.487 8.066 20.160	Feb 0 62.669 6.261 8.007 28.044	Mar 0 58.663 5.135 6.863 17.280	Apr 0 47.046 4.174 5.762 14.400	May 0 30.701 3.494 4.609 11.520	Jun 0 24.111 2.827 3.457 16.644	Jul 0 18.811 2.876 2.835 17.107	Aug 0 23.072 3.827 4.609 16.680	Sep 0 29.076 4.793 5.647 14.563	Tota 481.03 56.50 69.62 210.39
Hydro power val Hydroinc Res_KAM Res_TOK Res_AND Res_KAR Res_CHA Res_SHA	ue added, baseline, Oct 31.635 4.784 5.508 14.400 4.608	1000 USD Nov 0 49.856 5.705 6.770 20.570 5.535	Dec 0 48.056 6.140 7.490 19.029 5.997	Jan 0 57.343 6.487 8.066 20.160 6.458	Feb 0 62.669 6.261 8.007 28.044 6.458	Mar 0 58.663 5.135 6.863 17.280 5.535	Apr 0 47.046 4.174 5.762 14.400 4.613	May 0 30.701 3.494 4.609 11.520 3.690	Jun 0 24.111 2.827 3.457 16.644 2.768	Jul 0 18.811 2.876 2.835 17.107 2.768	Aug 0 23.072 3.827 4.609 16.680 3.689	Sep 0 29.076 4.793 5.647 14.563 4.606	Tota 481.03 56.50 69.62 210.39 56.72
Hydro power val Hydroinc Res_KAM Res_TOK Res_AND Res_KAR Res_CHA Res_CHA Res_SHA Res_ROG	ue added, baseline, Oct 31.635 4.784 5.508 14.400 4.608 0	1000 USD Nov 0 49.856 5.705 6.770 20.570 5.535 0	Dec 0 48.056 6.140 7.490 19.029 5.997 0	Jan 0 57.343 6.487 8.066 20.160 6.458 0	Feb 0 62.669 6.261 8.007 28.044 6.458 0	Mar 0 58.663 5.135 6.863 17.280 5.535 0	Apr 0 47.046 4.174 5.762 14.400 4.613 0	May 0 30.701 3.494 4.609 11.520 3.690 0	Jun 0 24.111 2.827 3.457 16.644 2.768 0	Jul 0 18.811 2.876 2.835 17.107 2.768 0	Aug 0 23.072 3.827 4.609 16.680 3.689 0	Sep 0 29.076 4.793 5.647 14.563 4.606 0	Tota 481.03 56.50 69.62 210.39 56.72 842.53
Hydro power val Hydroinc Res_KAM Res_TOK Res_AND Res_AND Res_KAR Res_CHA Res_CHA Res_SHA Res_SHA Res_COG Res_TMP	ue added, baseline, Oct 0 31.635 4.784 5.508 14.400 4.608 0 98.363	1000 USD 0 49.855 5.705 6.770 20.570 5.535 0 124.732	Dec 0 48.056 6.140 7.490 19.029 5.997 0 101.512	Jan 0 57.343 6.487 8.066 20.160 6.458 0 86.913	Feb 0 62.669 6.261 8.007 28.044 6.458 0 78.295	Mar 0 58.663 5.135 6.863 17.280 5.535 0 75.204	Apr 0 47.046 4.174 5.762 14.400 4.613 0 59.239	May 0 30.701 3.494 4.609 11.520 3.690 0 42.165	Jun 0 24.111 2.827 3.457 16.644 2.768 0 20.499	Jul 0 18.811 2.876 2.835 17.107 2.768 0 26.835	Aug 0 23.072 3.827 4.609 16.680 3.689 0 53.412	Sep 0 29.076 4.793 5.647 14.563 4.606 0 75.368	Tota 481.03 56.50 69.62 210.39 56.72 842.53 75.81
Hydro power val Hydroinc Res_KAM Res_TOK Res_AND Res_KAR Res_CHA Res_CHA Res_SHA Res_SHA Res_SHA Res_TMP Res_TMR	ue added, baseline, Oct 0 31.635 4.784 5.508 14.400 4.608 0 98.363 4.121	1000 USD Nov 49.856 5.705 6.770 20.570 5.535 0 124.732 8.504	Dec 0 48.056 6.140 7.490 19.029 5.997 0 101.512 9.213	Jan 0 57.343 6.487 8.066 20.160 6.458 0 86.913 9.922	Feb 0 62.669 6.261 8.007 28.044 6.458 0 78.295 9.922	Mar 0 58.663 5.135 6.863 17.280 5.535 0 75.204 8.501	Apr 0 47,046 4.174 5.762 14,400 4.613 0 59,239 3.752	May 0 30,701 3.494 4.609 11.520 3.690 0 42.165 4.110	Jun 0 24.111 2.827 3.457 16.644 2.768 0 20.499 3.949	Jul 0 18.811 2.876 2.835 17.107 2.768 0 26.835 3.747	Aug 0 23.072 3.827 4.609 16.680 3.689 0 53.412 4.267	Sep 0 29,076 4.793 5.647 14.563 4.606 0 75,368 5.807	Tota 481.03 56.50 69.62 210.39 56.72
Hydro power val Hydroinc Res_KAM Res_TOK Res_CAN Res_KAR Res_CHA Res_CHA Res_CHA Res_NUR Res_NUR Res_TMP Res_TMR Res_DAS	ue added, baseline, Oct 0 31.635 4.784 5.508 14.400 4.608 0 98.363 4.121 0	1000 USD Nov 0 49.856 5.705 6.770 20.570 20.570 5.535 0 124.732 8.504 0	Dec 0 48.056 6.140 7.490 19.029 5.997 0 101.512 9.213 0	Jan 0 57.343 6.487 8.066 20.160 6.458 0 86.913 9.922 0	Feb 0 62.669 6.261 8.007 28.044 6.458 0 78.295 9.922 0	Mar 0 58.663 5.135 6.863 17.280 5.535 0 75.204 8.501 0	Apr 0 47,046 4,174 5,762 14,400 4,613 0 59,239 3,752 0	May 0 30.701 3.494 4.609 11.520 3.690 0 42.165 4.110 0	Jun 0 24.111 2.827 3.457 16.644 2.768 0 20.499 3.949 0	Jul 0 18.811 2.876 2.835 17.107 2.768 0 26.835 3.747 0	Aug 0 23.072 3.827 4.609 16.680 3.689 0 53.412 4.267 0	Sep 0 29.076 4.793 5.647 14.563 4.606 0 75.368 5.807 0	Tota 481.03 56.50 69.62 210.39 56.72 842.53 75.81
Hydro power val Hydroinc Res_KAM Res_TOK Res_AND Res_KAR Res_CHA Res_CHA Res_SHA Res_SHA Res_TMP Res_TMP Res_TMR Res_TAR Res_TAR	ue added, baseline, 0 31.635 4.784 5.508 14.400 4.608 0 98.363 4.121 0 0	1000 USD Nov 0 49.856 5.705 6.770 20.570 5.535 0 124.732 8.504 0 0 0	Dec 0 48.056 6.140 19.029 5.997 0 101.512 9.213 0 0 0	Jan 0 57.343 6.487 8.066 20.160 6.458 0 86.913 9.922 0 0 0	Feb 0 62.669 6.261 8.007 28.044 6.458 0 78.295 9.922 9.922 0 0	Mar 0 58.663 5.135 6.863 17.280 5.535 0 75.204 8.501 0 0 0	Apr 0 47.046 4.174 5.762 14.400 4.613 0 59.239 3.752 0 0 0	May 0 30.701 3.494 4.609 11.520 0 42.165 4.110 0 0	Jun 0 24.111 2.827 3.457 16.644 2.768 0 20.499 3.949 0.0 0	Jul 0 18.811 2.876 2.835 17.107 2.768 0 26.835 3.747 0 0 0	Aug 0 23.072 3.827 4.609 16.680 3.689 0 53.412 4.267 0 0 0	Sep 0 29.076 4.793 5.647 14.563 4.606 0 75.368 5.807 0 0	Tota 481.03 56.50 69.62 210.39 56.72 842.53 75.81
Hydro power val Hydroinc Res_KAM Res_TOK Res_AND Res_KAR Res_KAR Res_CHA Res_SHA Res_SHA Res_NUR	ue added, baseline, Oct 0 31.635 4.784 5.508 14.400 4.608 0 98.363 4.121 0 0 0 0	1000 USD Nov 0 49.856 5.705 6.770 20.570 5.535 0 124.732 8.504 0 0 0	Dec 0 48.056 6.140 7.490 19.029 5.997 0 101.512 9.213 0 0 0 0	Jan 0 57.343 6.487 8.066 20.160 6.458 0 86.913 9.922 0 0 0 0	Feb 0 62,669 6,261 8,007 28,044 6,458 0 78,295 9,922 0 0 0 0	Mar 0 58.663 5.135 6.863 17.280 5.535 0 75.204 8.501 0 0 0 0	Apr 0 47,046 4.174 5.762 14.400 4.613 0 59,239 3.752 0 0 0 0	May 0 30.701 3.494 4.609 11.520 3.690 0 42.165 4.110 0 0 0 0 0	Jun 0 24.111 2.827 3.457 16.644 2.768 0 20.499 3.949 0. 0 0 0 0	Jul 0 18.811 2.876 2.835 17.107 2.768 0 26.835 3.747 0 0 0 0 0	Aug 0 23.072 3.827 4.609 16.680 3.689 0 53.412 4.267 0 0 0 0 0	Sep 0 29.076 4.793 5.647 14.563 4.606 0 75.368 5.807 0 0 0 0	Tota 481.03 56.50 69.62 210.39 56.72 842.53 75.81
Hydro power val Hydroinc Res_KAM Res_TOK Res_AND Res_CHA Res_CHA Res_CHA Res_CHA Res_CHA Res_NUR Res_TMP Res_TMP Res_DAS Res_ZAR Res_ZAR	ue added, baseline, Oct 0 31.635 4.784 5.508 14.400 4.608 0 98.363 4.121 0 0 0 0 0 0 0	1000 USD Nov 0 49.856 5.705 6.770 20.570 5.535 0 124.732 8.504 0 0 0 0 0 0	Dec 0 48.056 6.140 7.490 19.029 5.997 0 101.512 9.213 0 0 0 0 0 0	Jan 0 57.343 6.487 8.066 20.160 6.458 0 86.913 9.922 0 0 0 0 0	Feb 0 62.669 6.261 8.007 28.044 6.458 0 78.295 9.922 0 0 0 0 0 0 0 0	Mar 0 58.663 5.135 6.863 17.280 5.555 0 75.204 8.501 0 0 0 0 0 0 0 0	Apr 0 47.046 4.174 5.762 14.400 4.613 0 59.239 3.752 0 0 0 0 0 0 0	May 0 30.701 3.494 4.609 11.520 3.690 0 42.165 4.110 0 0 0 0 0 0 0	Jun 0 24.111 2.827 3.457 16.644 2.768 0 20.499 3.949 0 0 0 0 0 0 0 0	Jul 0 18.811 2.876 2.835 17.107 2.768 0 26.835 3.747 0 0 0 0 0 0 0 0	Aug 0 23.072 3.827 4.609 16.680 3.689 0 53.412 4.267 0 0 0 0 0 0 0 0 0 0	Sep 0 29.076 4.793 5.647 14.563 4.606 0 75.368 5.807 0 0 0 0 0 0 0	Totz 481.03 56.50 69.62 210.39 56.72 842.53 75.81

3. Average heads are also presented for all reservoirs and hydropower facilities.

	Hydro power heads	, m											
	HydroHead	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	Res_KAM	85	85	85	85	85	85	85	85	85	85	85	85
	Res_TOK	178	181	181	181	179	176	172	168	165	164	167	173
	Res_AND	99	98	97	94	90	85	82	87	97	99	99	99
	Res_KAR	20	20	21	21	21	21	21	21	21	21	21	20
	Res_CHA	145	145	147	145	131	115	112	126	141	146	147	147
	Res_SHA	22	22	22	22	22	22	22	22	22	22	22	22
	Res_ROG	86	86	86	86	86	86	86	86	86	86	86	86
	Res_NUR	189	216	223	222	217	205	186	161	138	133	147	163
3	Res_TMP	15	15	15	15	15	15	15	15	15	15	15	15
	Res_TMR	0	0	0	0	0	0	0	0	0	0	0	0
	Res_DAS	55	55	55	55	55	55	55	55	55	55	55	55
	Res_ZAR	85	85	85	85	85	85	85	85	85	85	85	85
	Res_NAR	0	0	0	0	0	0	0	0	0	0	0	0
	Res_FAR	0	0	0	0	0	0	0	0	0	0	0	0
	Res_VAH	0	0	0	0	0	0	0	0	0	0	0	0
	Res_CHI	0	0	0	0	0	0	0	0	0	0	0	0

Charts are also available for all tables presented in this section.

How to view summary agricultural data

Summary agricultural data are available on the "agriculture" worksheet. All data are aggregated to the basin-wide level and are also disaggregated by country and by crop type. The following types of summary data are presented:

- 1. Agricultural value added: Agricultural value added is equal to the difference between agricultural production value and agricultural input costs. These tables allow the user to view the impact of a scenario on the welfare of the agricultural sector. The disaggregated data allow the user to see how the welfare impacts of a given scenario are distributed by country and by crop type.
- Agricultural production value: Agricultural production value is equal to the product of agricultural production value and crop sakes price. These tables allow the user to view the impact of a scenario on gross revenue to agriculture. The disaggregated data allow the user to see how impacts are distributed by country and crop type.
- 3. Agricultural production: Agricultural production is equal to the product of crop yield times crop area. These tables allow the user to view the impact of a scenario on crop production. The disaggregated data allow the user to see how impacts are distributed by country and crop type.

		Agricu	ltural value added, bas	eline, 1000 U	ISD/year						Agricu	ultural value ad	ded, Scenario	, 1000 USD/
			cot	wht	ric	alf	veg	fru	oth	Total		cot	wht	ric
		KYR	66.439	68.249	12.014	24.373	-369	7.026	14.281	192.013	KYR	73.351	79.388	10.666
1		TAD	221.912	124.262	74.225	29.306	8.767	60.477	196.926	715.875	TAD	255.405	102.191	109.174
		TUR	771.750	273.616	42.345	41.704	24.176	170.849	44.659	1.369.099	TUR	842.649	224.161	66.466
		UZB	2.784.742	898.126	156.058	222.774	283.288	177.083	739.161	5.261.232	UZB	3.202.436	717.879	145.818
		KAZ	254.356	40.496	14.039	109.497	605	3.033	20.106	442.132	KAZ	280.720	36.349	15.912
		All	4.099.199	1.404.749	298.681	427.654	316.467	418.468	1.015.133	7.980.351	All	4.654.561	1.159.968	348.036
		Agricu	Itural production value	, baseline, 10	000 USD						Agricu	ultural product	ion Scenario, 1	LOOO USD
	AgriSale	s	cot	wht	ric	alf	veg	fru	oth	Total		cot	wht	ric
		KYR	91.468	83.882	14.860	36.605	15.817	9.303	62.631	314.566	KYR	102.635	98.536	13.328
2		TAD	324.500	253.842	81.244	48.810	39.903	67.106	232.023	1.047.428	TAD	382.643	214.418	120.004
		TUR	1.312.500	678.240	46.540	52.940	48.859	195.697	56.459	2.391.235	TUR	1.454.858	573.584	73.088
		UZB	3.689.000	1.503.390	187.729	287.964	807.521	210.255	1.008.352	7.694.211	UZB	4.295.472	1.218.683	176.100
		KAZ	352.000	67.666	15.923	136.633	16.140	33.255	64.223	685.840	KAZ	392.256	58.115	18.082
		All	5.769.468	2.587.020	346.296	562.952	928.240	515.616	1.423.688	12.133.280	All	6.627.864	2.163.336	400.602
		Agricu	ltural production, base	line, ton/yea	r						Agricu	ultural product	ion Scenario, t	on/year
	AgriPro	Ь	cot	wht	ric	alf	veg	fru	oth	Total		cot	wht	ric
		KYR	91.468	279.606	29.719	366.050	395.415	20.672	835.080	2.018.010	KYR	102.635	328.454	26.656
		TAD	324.500	846.140	162.488	488.104	997.569	149.124	3.093.641	6.061.566	TAD	382.643	714.723	240.007
3		TUR	1.312.500	2.260.800	93.079	529.401	1.221.484	434.882	752.784	6.604.930	TUR	1.454.858	1.911.947	146.177
		UZB	3.689.000	5.011.300	375.459	2.879.640	20.188.041	467.233	13.444.693	46.055.366	UZB	4.295.472	4.062.276	352.199
		KAZ	352.000	225.554	31.844	1.366.325	403.488	73.899	856.295	3.309.405	KAZ	392.256	193.719	36.165
		All	5.769.468	8.623.400	692.589	5.629.520	23.205.997	1.145.810	18.982.493	64.049.277	All	6.627.864	7.211.119	801.204

- 4. Water use: These tables allow the user to view the impact of a scenario on agricultural water use. The disaggregated data allow the user to see how impacts are distributed by country and crop type.
- 5. Land use: These tables allow the user to view the impact of a scenario on agricultural land use. The disaggregated data allow the user to see how impacts are distributed by country and crop type.
- 6. Labor use: These tables allow the user to view the impact of a scenario on agricultural labor use. The disaggregated data allow the user to see how impacts are distributed by country and crop type.

		Wate	r use, baseline, mm3								Wate	r use, counterf	actural mm3	
	WaterU	se	cot	wht	ric	alf	veg	fru	oth	Total		cot	wht	ric
		KYR	220	145	194	324	127	22	1.018	2.050	KYR	257	178	181
4		TAD	2.547	2.984	700	1.304	537	189	806	9.067	TAD	3.172	2.536	1.081
	/	TUR	13.419	7.162	525	1.152	341	548	295	23.442	TUR	15.223	6.189	830
		UZB	16.590	9.219	2.841	4.308	6.151	569	6.569	46.247	UZB	20.211	7.592	2.727
		KAZ	1.809	452	247	2.013	193	542	968	6.224	KAZ	2.067	361	286
		All	34.585	19.962	4.507	9.101	7.349	1.870	9.656	87.030	All	40.930	16.856	5.105
			use, baseline, ha								Land	use, Scenario, ł		
	LandUs	e	cot	wht	ric	alf	veg	fru	oth	Total		cot	wht	ric
		KYR	40.500	37.400	13.300	57.700	26.361	5.500	154.968	335.729	KYR	47.385	45.810	12.438
		TAD	166.000	310.000	32.800	92.000	50.710	16.010	112.490	780.010	TAD	205.884	268.482	50.605
5	1	TUR	875.000	968.000	19.600	53.000	40.200	60.020	37.820	2.053.640	TUR	990.630	835.941	30.944
	/	UZB	1.463.200	1.448.000	148.000	307.500	853.800	80.120	862.790	5.163.410	UZB	1.768.672	1.198.094	141.506
		KAZ	158.000	65.000	8.800	127.999	25.300	73.000	141.400	599.499	KAZ	180.480	52.073	10.145
		All	2.702.700	2.828.400	222.500	638.199	996.371	234.650	1.309.468	8.932.288	All	3.193.051	2.400.400	245.638
			use, baseline, 1000 US								Labor	use, Scenario,		
	LabrUse		cot	wht	ric	alf	veg	fru	oth	Total		cot	wht	ric
		KYR	9.720	5.984	1.064	4.616	6.327	880	18.596	47.187	KYR	11.372	7.330	995
		TAD	39.840	49.600	2.624	7.360	12.170	2.562	13.498	127.654	TAD	49.412	42.958	4.049
6		TUR	210.000	154.880	1.568	4.240	9.648	9.603	4.539	394.478	TUR	237.751	133.751	2.476
		UZB	351.168	231.680	11.840	24.600	204.912	12.819	103.535	940.554	UZB	424.480	191.696	11.321
		KAZ	37.921	10.400	704	10.240	6.072	11.680	16.968	93.985	KAZ	43.315	8.331	812
		All	648.649	452.544	17.800	51.056	239.129	37.544	157.136	1.603.858	All	766.330	384.066	19.653

- 7. Ratio of value added to water use: These tables allow the user to see how the ratio of value added to water use changes from the baseline to the scenario for each country and crop type.
- 8. Ratio of value added to land use: These tables allow the user to see how the ratio of value added land use changes from the baseline to the scenario for each country and crop type.

	cot	wht	ric	alf	veg	fru	oth	Total		cot	w
KYR	302	471	62	75	-3	319	14	94	KYR	285	44
TAD	87	42	106	22	16	320	244	79	TAD	81	
TUR	58	38	81	36	71	312	151	58	TUR	55	:
UZB	168	97	55	52	46	311	113	114	UZB	158	9
KAZ	141	90	57	54	3	6	21	71	KAZ	136	10
All	119	70	66	47	43	224	105	92	All	114	

8

Katio of Value	added to land us	e, baseline,	USD/na						Ratio of	value added to	o land use,
	cot	wht	ric	alf	veg	fru	oth	Total		cot	wht
KYR	1.640	1.825	903	422	-14	1.277	92	572	KYR	1.548	1.733
TAD	1.337	401	2.263	319	173	3.777	1.751	918	TAD	1.241	381
TUR	882	283	2.160	787	601	2.847	1.181	667	TUR	851	268
UZB	1.903	620	1.054	724	332	2.210	857	1.019	UZB	1.811	599
KAZ	1.610	623	1.595	855	24	42	142	738	KAZ	1.555	698
All	1.517	497	1.342	670	318	1.783	775	893	All	1.458	483

- 9. Yield: These tables allow the user to see how crop yields change from the baseline to the scenario for each country and crop type.
- 10. Water intensity: These tables allow the user to see how per hectare water use changes from the baseline to the scenario for each country and crop type.

Yield, baselin	e, ton/ha								Yield, Sce	nario, ton/ha	
	cot	wht	ric	alf	veg	fru	oth	Total		cot	wht
KYR	2,3	7,5	2,2	6,3	15,0	3,8	5,4	6,0	KYR	2,2	7,2
TAD	2,0	2,7	5,0	5,3	19,7	9,3	27,5	7,8	TAD	1,9	2,7
TUR	1,5	2,3	4,7	10,0	30,4	7,2	19,9	3,2	TUR	1,5	2,3
UZB	2,5	3,5	2,5	9,4	23,6	5,8	15,6	8,9	UZB	2,4	3,4
KAZ	2,2	3,5	3,6	10,7	15,9	1,0	6,1	5,5	KAZ	2,2	3,7
All	2,1	3,0	3,1	8,8	23,3	4,9	14,5	7,2	All	2,1	
	sity baseline, m3/ha	1			,	-				tensity scenari	o, m3/h
Water inten	sity baseline, m3/ha cot	wht	3,1 ric	alf	veg	4,9 fru	oth	Total			o, m3/h a wh
	sity baseline, m3/ha	1			,	-				tensity scenari	o, m3/h a wh
Water inten	sity baseline, m3/ha cot	wht	ric	alf	veg	fru	oth	Total	Water in	tensity scenari	3,0 0, m3/ha whi 3,9 9,4
Water intens	ity baseline, m3/ha cot 5,4	wht 3,9	ric 14,6	alf 5,6	veg 4,8	fru 4,0	oth 6,6	Total 6,1	Water in	tensity scenari cot 5,4	<mark>o, m3/h</mark> a wh 3,9 9,4
Water intens KYR TAD	<mark>ity baseline, m3/ha</mark> cot 5,4 15,3	wht 3,9 9,6	ric 14,6 21,3	alf 5,6 14,2	veg 4,8 10,6	fru 4,0 11,8	oth 6,6 7,2	Total 6,1 11,6	Water in KYR TAD	tensity scenari cot 5,4 15,4	<mark>io, m3/h</mark> a wh 3, <u>9</u> 9,4 7,4
Water intens KYR TAD TUR	ity baseline, m3/ha cot 5,4 15,3 15,3	wht 3,9 9,6 7,4	ric 14,6 21,3 26,8	alf 5,6 14,2 21,7	veg 4,8 10,6 8,5	fru 4,0 11,8 9,1	oth 6,6 7,2 7,8	Total 6,1 11,6 11,4	Water in KYR TAD TUR	tensity scenari cot 5,4 15,4 15,4	o, m3/h a wh 3,9

Charts are also available for all tables presented in this section.

How to view agricultural data that are disaggregated by planning zone

Agricultural data that are disaggregated by planning zone are available on the "agricultureByZone" worksheet. Data presented are the same as data presented on the "agriculture" worksheet. The following types of summary data are presented:

- 1. Agricultural value added.
- 2. Agricultural production value.

	204.682	618.001								225.864	617.998	
Agricultura	I value added,	baseline, 10	00 USD/yea	ar					Agricultural	value added, 9	Scenario, 1000	USD/ye
	cot	wht	ric	alf	veg	fru	oth	Total		cot	wht	1
FER_UZB	651.318	296.524	37.678	97.925	125.351	10.315	269.491	1.488.602	FER_UZB	708.080	258.042	31.9
SYR_UZB	368.950	128.286	14.366	7.985	5.704	5.470	30.136	560.897	SYR_UZB	431.035	99.323	15.0
CHI_UZB	207.402	80.006	32.008	14.339	59.128	22.736	104.712	520.331	CHI_UZB	245.653	63.448	31.7
SUR_UZB	268.750	94.494	11.951	8.070	33.154	7.516	77.680	501.615	SUR_UZB	306.546	75.669	10.9
KAS_UZB	349.524	48.958	3.432	9.504	-975	706	39.147	450.296	KAS_UZB	436.338	26.864	2.3
ZAR_UZB	598.904	178.962	37.996	58.455	60.619	389	194.434	1.129.759	ZAR_UZB	698.950	132.797	34.
SOU_UZB	339.894	70.896	18.627	26.496	307	129.951	23.561	609.732	SOU_UZB	375.834	61.736	19.3
SYR_KAZ	63.130	17.940	302	11.132	578	324	11.073	104.479	SYR_KAZ	68.150	18.517	
CHI_KAZ	28.392	8.068	136	5.006	260	146	4.980	46.988	CHI_KAZ	30.650	8.328	1
NOR_KAZ	162.834	14.488	13.601	93.359	-233	2.563	4.053	290.665	NOR_KAZ	181.920	9.504	15.5
AMU_TUR	539.784	192.718	42.059	32.957	21.715	5.325	32.391	866.949	AMU_TUR	592.447	154.724	66.3
SOU_TUR	231.966	80.898	286	8.747	2.461	165.524	12.268	502.150	SOU_TUR	250.202	69.437	
FER_KYR	66.439	68.249	12.014	24.373	-369	7.026	14.281	192.013	FER_KYR	73.351	79.388	10.
FER_TAD	26.281	58.207	21.575	10.142	6.765	8.856	88.949	220.775	FER_TAD	27.584	55.199	30.
UPA_TAD	192.806	59.798	50.331	18.074	1.275	50.669	98.415	471.368	UPA_TAD	224.860	41.058	75.
ZAR_TAD	2.825	6.257	2.319	1.090	727	952	9.562	23.732	ZAR_TAD	2.961	5.934	3.
UPA_AFG	0	0	0	0	0	0	0	0	UPA_AFG	0	0	
All	4.099.199	1.404.749	298.681	427.654	316.467	418.468	1.015.133	7.980.351	All	4.654.561	1.159.968	348.
Agricultura	I production v) alf					Agricultural	production So	enario. 1000 U	
FER_UZB	cot	wht	ric				- 41-	Tatal		•		130
					veg	fru	oth	Total		cot	wht	
_	856.000	411.390	45.703	109.903	283.456	11.640	321.161	2.039.253	FER_UZB	cot 933.944	wht 359.589	38.
SYR_UZB	508.000	242.400	45.703 16.977	109.903 14.769	283.456 73.612	11.640 8.907	321.161 65.582	2.039.253 930.247	SYR_UZB	cot 933.944 602.487	wht 359.589 194.535	38. 17.
SYR_UZB CHI_UZB	508.000 276.000	242.400 135.600	45.703 16.977 38.000	109.903 14.769 21.335	283.456 73.612 140.790	11.640 8.907 25.634	321.161 65.582 127.551	2.039.253 930.247 764.910	SYR_UZB CHI_UZB	cot 933.944 602.487 330.955	wht 359.589 194.535 110.376	38. 17. 37.
SYR_UZB CHI_UZB SUR_UZB	508.000 276.000 346.000	242.400 135.600 143.400	45.703 16.977 38.000 14.091	109.903 14.769 21.335 11.250	283.456 73.612 140.790 107.448	11.640 8.907 25.634 12.070	321.161 65.582 127.551 97.024	2.039.253 930.247 764.910 731.283	SYR_UZB CHI_UZB SUR_UZB	cot 933.944 602.487 330.955 398.141	wht 359.589 194.535 110.376 116.669	38. 17. 37. 12.
SYR_UZB CHI_UZB SUR_UZB KAS_UZB	508.000 276.000 346.000 462.000	242.400 135.600 143.400 161.400	45.703 16.977 38.000 14.091 6.000	109.903 14.769 21.335 11.250 16.500	283.456 73.612 140.790 107.448 9.463	11.640 8.907 25.634 12.070 1.038	321.161 65.582 127.551 97.024 56.662	2.039.253 930.247 764.910 731.283 713.063	SYR_UZB CHI_UZB SUR_UZB KAS_UZB	cot 933.944 602.487 330.955 398.141 594.236	wht 359.589 194.535 110.376 116.669 112.108	38. 17. 37. 12. 4.
SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB	508.000 276.000 346.000 462.000 767.000	242.400 135.600 143.400 161.400 300.600	45.703 16.977 38.000 14.091 6.000 45.207	109.903 14.769 21.335 11.250 16.500 68.207	283.456 73.612 140.790 107.448 9.463 184.709	11.640 8.907 25.634 12.070 1.038 729	321.161 65.582 127.551 97.024 56.662 250.916	2.039.253 930.247 764.910 731.283 713.063 1.617.368	SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB	cot 933.944 602.487 330.955 398.141 594.236 905.311	wht 359.589 194.535 110.376 116.669 112.108 229.305	38. 17. 37. 12. 4. 41.
SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB	508.000 276.000 346.000 462.000 767.000 474.000	242.400 135.600 143.400 161.400 300.600 108.600	45.703 16.977 38.000 14.091 6.000 45.207 21.751	109.903 14.769 21.335 11.250 16.500 68.207 46.000	283.456 73.612 140.790 107.448 9.463 184.709 8.043	11.640 8.907 25.634 12.070 1.038 729 150.237	321.161 65.582 127.551 97.024 56.662 250.916 89.456	2.039.253 930.247 764.910 731.283 713.063 1.617.368 898.087	SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB	cot 933.944 602.487 330.955 398.141 594.236 905.311 530.398	wht 359.589 194.535 110.376 116.669 112.108 229.305 96.101	38. 17. 37. 12. 4. 41. 22.
SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ	508.000 276.000 346.000 462.000 767.000 474.000 87.365	242.400 135.600 143.400 161.400 300.600 108.600 23.231	45.703 16.977 38.000 14.091 6.000 45.207 21.751 398	109.903 14.769 21.335 11.250 16.500 68.207 46.000 15.815	283.456 73.612 140.790 107.448 9.463 184.709 8.043 4.236	11.640 8.907 25.634 12.070 1.038 729 150.237 838	321.161 65.582 127.551 97.024 56.662 250.916 89.456 19.010	2.039.253 930.247 764.910 731.283 713.063 1.617.368 898.087 150.893	SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ	cot 933.944 602.487 330.955 398.141 594.236 905.311 530.398 95.117	wht 359.589 194.535 110.376 116.669 112.108 229.305 96.101 24.135	38. 17. 37. 12. 4. 41. 22.
SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ	508.000 276.000 346.000 462.000 767.000 474.000 87.365 39.291	242.400 135.600 143.400 161.400 300.600 108.600 23.231 10.448	45.703 16.977 38.000 14.091 6.000 45.207 21.751 398 179	109.903 14.769 21.335 11.250 16.500 68.207 46.000 15.815 7.112	283.456 73.612 140.790 107.448 9.463 184.709 8.043 4.236 1.905	11.640 8.907 25.634 12.070 1.038 729 150.237 838 377	321.161 65.582 127.551 97.024 56.662 250.916 89.456 19.010 8.550	2.039.253 930.247 764.910 731.283 713.063 1.617.368 898.087 150.893 67.862	SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ	cot 933.944 602.487 330.955 398.141 594.236 905.311 530.398 95.117 42.778	wht 359.589 194.535 110.376 116.669 112.108 229.305 96.101 24.135 10.855	38. 17. 37. 12. 4. 41. 22.
SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ	508.000 276.000 346.000 462.000 767.000 474.000 87.365 39.291 225.344	242.400 135.600 143.400 161.400 300.600 108.600 23.231 10.448 33.987	45.703 16.977 38.000 14.091 6.000 45.207 21.751 398 179 15.346	109.903 14.769 21.335 11.250 16.500 68.207 46.000 15.815 7.112 113.706	283.456 73.612 140.790 107.448 9.463 184.709 8.043 4.236 1.905 9.999	11.640 8.907 25.634 12.070 1.038 729 150.237 838 377 32.040	321.161 65.582 127.551 97.024 56.662 250.916 89.456 19.010 8.550 36.663	2.039.253 930.247 764.910 731.283 713.063 1.617.368 898.087 150.893 67.862 467.085	SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ	cot 933.944 602.487 330.955 398.141 594.236 905.311 530.398 95.117 42.778 254.361	wht 359.589 194.535 110.376 116.669 112.108 229.305 96.101 24.135 10.855 23.125	38. 17. 37. 12. 4. 41. 22.
SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR	508.000 276.000 346.000 462.000 767.000 87.365 39.291 225.344 918.000	242.400 135.600 143.400 161.400 300.600 108.600 23.231 10.448 33.987 505.800	45.703 16.977 38.000 14.091 6.000 45.207 21.751 398 179 15.346 46.040	109.903 14.769 21.335 11.250 16.500 68.207 46.000 15.815 7.112 113.706 41.437	283.456 73.612 140.790 107.448 9.463 184.709 8.043 4.236 1.905 9.999 43.819	11.640 8.907 25.634 12.070 1.038 729 150.237 838 377 32.040 6.161	321.161 65.582 127.551 97.024 56.662 250.916 89.456 19.010 8.550 36.663 42.216	2.039.253 930.247 764.910 731.283 713.063 1.617.368 898.087 150.893 67.862 467.085 1.603.473	SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR	cot 933.944 602.487 330.955 398.141 594.236 905.311 530.398 95.117 42.778 254.361 1.025.878	wht 359.589 194.535 110.376 116.669 112.108 229.305 96.101 24.135 10.855 23.125 423.617	38. 17. 37. 12. 4. 41. 22. 17. 72.
SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR SOU_TUR	508.000 276.000 346.000 462.000 767.000 474.000 87.365 39.291 225.344 918.000 394.500	242.400 135.600 143.400 161.400 300.600 108.600 23.231 10.448 33.987 505.800 172.440	45.703 16.977 38.000 14.091 6.000 45.207 21.751 398 179 15.346 46.040 500	109.903 14.769 21.335 11.250 16.500 68.207 46.000 15.815 7.112 113.706 41.437 11.503	283.456 73.612 140.790 107.448 9.463 184.709 8.043 4.236 1.905 9.999 43.819 5.040	11.640 8.907 25.634 12.070 1.038 729 150.237 838 377 32.040 6.161 189.536	321.161 65.582 127.551 97.024 56.662 250.916 89.456 19.010 8.550 36.663 42.216 14.243	2.039.253 930.247 764.910 731.283 713.063 1.617.368 898.087 150.893 67.862 467.085 1.603.473 787.762	SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR SOU_TUR	cot 933.944 602.487 330.955 398.141 594.236 905.311 530.398 95.117 42.778 254.361 1.025.878 428.980	wht 359.589 194.535 110.376 116.669 112.108 229.305 96.101 24.135 10.855 23.125 423.617 149.967	38. 17. 37. 12. 4. 41. 22. 17. 72.
SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR SOU_TUR FER_KYR	508.000 276.000 346.000 462.000 767.000 474.000 87.365 39.291 225.344 918.000 394.500 91.468	242.400 135.600 143.400 161.400 300.600 108.600 23.231 10.448 33.987 505.800 172.440 83.882	45.703 16.977 38.000 14.091 6.000 45.207 21.751 398 179 15.346 46.040 500 14.860	109.903 14.769 21.335 11.250 16.500 68.207 46.000 15.815 7.112 113.706 41.437 11.503 36.605	283.456 73.612 140.790 107.448 9.463 184.709 8.043 4.236 1.905 9.999 43.819 5.040 15.817	11.640 8.907 25.634 12.070 1.038 729 150.237 838 377 32.040 6.161 189.536 9.303	321.161 65.582 127.551 97.024 56.662 250.916 89.456 19.010 8.550 36.663 42.216 14.243 62.631	2.039.253 930.247 764.910 731.283 1.617.368 898.087 150.893 67.862 467.085 1.603.473 787.762 314.566	SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ AMU_TUR SOU_TUR FER_KYR	cot 933.944 602.487 330.955 398.141 594.236 905.311 530.398 95.117 42.778 254.361 1.025.878 428.980 102.635	wht 359.589 194.535 110.376 116.669 112.108 229.305 96.101 24.135 10.855 23.125 423.617 149.967 98.536	38. 17. 37. 12. 4. 41. 22. 17. 72.
SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR SOU_TUR FER_KYR FER_TAD	508.000 276.000 346.000 462.000 767.000 474.000 87.365 39.291 225.344 918.000 394.500 91.468 44.695	242.400 135.600 143.400 161.400 300.600 23.231 10.448 33.987 505.800 172.440 83.882 96.704	45.703 16.977 38.000 14.091 6.000 45.207 21.751 398 179 15.346 46.040 500 14.860 24.087	109.903 14.769 21.335 11.250 16.500 68.207 46.000 15.815 7.112 113.706 41.437 11.503 36.605 17.607	283.456 73.612 140.790 107.448 9.463 184.709 8.043 4.236 1.905 9.999 43.819 5.040 15.817 22.842	11.640 8.907 25.634 12.070 1.038 729 150.237 838 377 32.040 6.161 189.536 9.303 10.725	321.161 65.582 127.551 97.024 56.662 250.916 89.456 19.010 8.550 36.663 42.216 14.243 62.631 102.522	2.039.253 930.247 764.910 731.283 713.063 1.617.368 898.087 150.893 67.852 467.085 1.603.473 787.762 314.566 319.182	SYR_UZB CH_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CH_KAZ NOR_KAZ AMU_TUR FER_KYR FER_TAD	cot 933.944 602.487 330.955 398.141 594.236 905.311 530.398 95.117 42.778 254.361 1.025.878 428.980 102.635 47.726	wht 359.589 194.535 110.376 116.669 112.108 229.305 96.101 24.135 10.855 23.125 423.617 149.967 98.536 93.208	38. 17. 37. 12. 4. 41. 22. 17. 72. 13. 33.
SYR_UZB CHI_UZB SUR_UZB XAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR SOU_TUR SOU_TUR FER_KYR FER_TAD UPA_TAD	508.000 276.000 346.000 462.000 474.000 87.365 39.291 225.344 918.000 394.500 91.468 44.695 275.000	242.400 135.600 143.400 161.400 108.600 23.231 10.448 33.987 505.800 172.440 83.882 96.704 146.742	45.703 16.977 38.000 14.091 6.000 45.207 21.751 398 179 15.346 46.040 500 14.860 24.087 54.568	109.903 14.769 21.335 11.250 16.500 68.207 46.000 15.815 7.112 113.706 41.437 11.503 36.605 17.607 29.310	283.456 73.612 140.790 107.448 9.463 184.709 8.043 4.236 1.905 9.999 43.819 5.040 15.817 22.842 14.605	11.640 8.907 25.634 12.070 1.038 729 150.237 838 377 32.040 6.161 189.536 9.303 10.725 55.228	321.161 65.582 127.551 97.024 56.662 250.916 89.456 19.010 8.550 36.663 42.216 14.243 62.631 102.522 118.480	2.039.253 930.247 764.910 731.283 1.617.368 898.087 150.893 67.862 467.085 1.603.473 787.762 314.566 319.182 693.933	SYR_UZB CH_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SOU_UZB SYR_KAZ NOR_KAZ AMU_TUR SOU_TUR SOU_TUR FER_KYR FER_TAD UPA_TAD	cot 933.944 602.487 330.955 398.141 594.236 905.311 530.398 95.117 42.778 254.361 1.025.878 428.980 102.635 47.726 329.794	wht 359.589 194.535 110.376 116.669 112.108 229.305 96.101 24.135 10.855 23.125 423.617 149.967 98.536 93.208 111.190	38. 17. 37. 12. 4. 41. 22. 17. 72. 13. 33. 82.
SYR_UZB CHI_UZB SUR_UZB XAS_UZB ZAR_UZB SOU_UZB SOU_UZB SOU_ZB SOU_ZCB SOU_ZCB SOU_ZCB SOU_ZCB SOU_ZCB CHI_KAZ AMU_TUR SOU_TUR FER_KAYR UPA_TAD ZAR_TAD	508.000 276.000 346.000 462.000 767.000 474.000 87.365 39.291 225.344 918.000 394.500 91.468 44.695 275.000 4.805	242.400 135.600 143.400 300.600 108.600 23.231 10.448 33.987 505.800 172.440 83.882 96.704 146.742 10.396	45.703 16.977 38.000 14.091 6.000 45.207 21.751 398 179 15.346 46.040 500 14.860 24.087 54.568 2.589	109.903 14.769 21.335 11.250 16.500 68.207 46.000 15.815 7.112 113.706 41.437 11.503 36.605 17.607 29.310 1.893	283.456 73.612 140.790 107.448 9.463 184.709 8.043 4.236 1.905 9.999 43.819 5.040 15.817 22.842 14.605 2.456	11.640 8.907 25.634 12.070 1.038 729 150.237 838 377 32.040 6.161 189.536 9.303 10.725 55.228 1.153	321.161 65.582 127.551 97.024 56.662 250.916 89.456 19.010 8.550 36.663 42.216 14.243 62.631 102.522 118.480 11.021	2.039.253 930.247 764.910 731.283 713.063 1.617.368 898.087 150.893 67.862 467.085 1.603.473 787.762 314.566 319.182 693.993 34.313	SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR SOU_TUR FER_KYR FER_TAD UPA_TAD ZAR_TAD	cot 933.944 602.487 330.955 398.141 594.236 905.311 530.398 95.117 42.778 254.361 1.025.878 428.980 102.635 47.726 329.794 5.123	wht 359.589 194.535 110.376 116.669 112.108 229.305 96.101 24.135 10.855 23.125 423.617 149.967 98.536 93.208 111.190 10.020	38. 17. 37. 12. 4. 41. 22. 17. 72. 13. 33. 82.
SYR_UZB CHI_UZB SUR_UZB XAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR SOU_TUR SOU_TUR FER_KYR FER_TAD UPA_TAD	508.000 276.000 346.000 462.000 474.000 87.365 39.291 225.344 918.000 394.500 91.468 44.695 275.000	242.400 135.600 143.400 161.400 108.600 23.231 10.448 33.987 505.800 172.440 83.882 96.704 146.742	45.703 16.977 38.000 14.091 6.000 45.207 21.751 398 179 15.346 46.040 500 14.860 24.087 54.568	109.903 14.769 21.335 11.250 16.500 68.207 46.000 15.815 7.112 113.706 41.437 11.503 36.605 17.607 29.310	283.456 73.612 140.790 107.448 9.463 184.709 8.043 4.236 1.905 9.999 43.819 5.040 15.817 22.842 14.605	11.640 8.907 25.634 12.070 1.038 729 150.237 838 377 32.040 6.161 189.536 9.303 10.725 55.228	321.161 65.582 127.551 97.024 56.662 250.916 89.456 19.010 8.550 36.663 42.216 14.243 62.631 102.522 118.480	2.039.253 930.247 764.910 731.283 1.617.368 898.087 150.893 67.862 467.085 1.603.473 787.762 314.566 319.182 693.933	SYR_UZB CH_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SOU_UZB SYR_KAZ NOR_KAZ AMU_TUR SOU_TUR SOU_TUR FER_KYR FER_TAD UPA_TAD	cot 933.944 602.487 330.955 398.141 594.236 905.311 530.398 95.117 42.778 254.361 1.025.878 428.980 102.635 47.726 329.794	wht 359.589 194.535 110.376 116.669 112.108 229.305 96.101 24.135 10.855 23.125 423.617 149.967 98.536 93.208 111.190	38. 17. 37. 12. 4. 41. 22. 17. 72. 13. 33. 82. 3.

フ

3. Agricultural production.

4. Water use.

3

4

Agricultural	production,	baseline, ton	/year						Agricultural	production Sc	enario, ton/ye	ar
	cot	wht	ric	alf	veg	fru	oth	Total		cot	wht	ric
FER_UZB	856.000	1.371.300	91.406	1.099.030	7.086.400	25.867	4.282.147	14.812.150	FER_UZB	933.944	1.198.630	77.703
SYR_UZB	508.000	808.000	33.954	147.692	1.840.311	19.792	874.429	4.232.178	SYR_UZB	602.487	648.449	35.794
CHI_UZB	276.000	452.000	76.000	213.349	3.519.750	56.966	1.700.678	6.294.743	CHI_UZB	330.955	367.920	75.935
SUR_UZB	346.000	478.000	28.182	112.500	2.686.200	26.822	1.293.658	4.971.362	SUR_UZB	398.141	388.898	25.951
KAS_UZB	462.000	538.000	12.000	165.000	236.583	2.306	755.496	2.171.385	KAS_UZB	594.236	373.695	8.883
ZAR_UZB	767.000	1.002.000	90.415	682.069	4.617.715	1.619	3.345.540	10.506.358	ZAR_UZB	905.311	764.349	82.738
SOU_UZB	474.000	362.000	43.502	460.000	201.082	333.861	1.192.745	3.067.190	SOU_UZB	530.398	320.335	45.195
SYR_KAZ	87.365	77.437	795	158.145	105.897	1.861	253.467	684.967	SYR_KAZ	95.117	80.451	646
CHI_KAZ	39.291	34.826	358	71.124	47.626	837	113.994	308.056	CHI_KAZ	42.778	36.185	290
NOR_KAZ	225.344	113.291	30.691	1.137.056	249.965	71.201	488.834	2.316.382	NOR_KAZ	254.361	77.083	35.229
AMU_TUR	918.000	1.686.000	92.079	414.371	1.095.484	13.691	562.884	4.782.509	AMU_TUR	1.025.878	1.412.057	145.351
SOU_TUR	394.500	574.800	1.000	115.030	126.000	421.191	189.900	1.822.421	SOU_TUR	428.980	499.890	826
FER_KYR	91.468	279.606	29.719	366.050	395.415	20.672	835.080	2.018.010	FER_KYR	102.635	328.454	26.656
FER_TAD	44.695	322.347	48.173	176.072	571.056	23.834	1.366.956	2.553.133	FER_TAD	47.726	310.692	67.985
UPA_TAD	275.000	489.140	109.136	293.104	365.123	122.728	1.579.735	3.233.966	UPA_TAD	329.794	370.632	164.711
ZAR_TAD	4.805	34.653	5.179	18.928	61.390	2.562	146.950	274.467	ZAR_TAD	5.123	33.399	7.311
UPA_AFG	0	0	0	0	0	0	0	0	UPA_AFG	0	0	0
All	5.769.468	8.623.400	692.589	5.629.520	23.205.997	1.145.810	18.982.493	64.049.277	All	6.627.864	7.211.119	801.204

Water use, ba	aseline, mm3								Water use, co	unterfactural	mm3	
	cot	wht	ric	alf	veg	fru	oth	Total		cot	wht	ric
FER_UZB	3.167	1.582	563	659	1.694	20	1.408	9.093	FER_UZB	3.494	1.399	484
SYR_UZB	2.357	1.626	217	362	794	54	909	6.319	SYR_UZB	2.906	1.357	238
CHI_UZB	834	760	454	325	869	46	544	3.832	CHI_UZB	1.037	642	471
SUR_UZB	1.261	676	180	168	864	74	514	3.737	SUR_UZB	1.495	567	171
KAS_UZB	2.634	2.094	280	570	144	6	401	6.129	KAS_UZB	3.698	1.587	226
ZAR_UZB	3.702	1.875	767	732	1.674	5	1.345	10.100	ZAR_UZB	4.544	1.488	730
SOU_UZB	2.635	606	380	1.492	112	364	1.448	7.037	SOU_UZB	3.037	552	407
SYR_KAZ	453	87	9	275	47	9	171	1.051	SYR_KAZ	504	93	7
CHI_KAZ	200	38	5	134	20	4	80	481	CHI_KAZ	223	40	4
NOR_KAZ	1.156	327	233	1.604	126	529	717	4.692	NOR_KAZ	1.340	228	275
AMU_TUR	10.048	5.380	499	914	306	17	247	17.411	AMU_TUR	11.515	4.621	808
SOU_TUR	3.371	1.782	26	238	35	531	48	6.031	SOU_TUR	3.708	1.568	22
FER_KYR	220	145	194	324	127	22	1.018	2.050	FER_KYR	257	178	181
FER_TAD	380	603	243	468	206	39	311	2.250	FER_TAD	415	595	351
UPA_TAD	2.115	2.271	430	793	289	144	459	6.501	UPA_TAD	2.700	1.832	691
ZAR_TAD	52	110	27	43	42	6	36	316	ZAR_TAD	57	109	39
UPA_AFG	0	0	0	0	0	0	0	0	UPA_AFG	0	0	0
0	34.585	19.962	4.507	9.101	7.349	1.870	9.656	87.030	0	40.930	16.856	5.105

5. Land use.

Land use, b	aseline								Land use, Sc	enario		
	cot	wht	ric	alf	veg	fru	oth	Total		cot	wht	ric
FER_UZB	331.200	274.800	37.500	56.500	257.500	3.200	165.610	1.126.310	FER_UZB	365.477	242.936	32.241
SYR_UZB	225.000	273.000	12.200	32.000	110.600	8.300	113.610	774.710	SYR_UZB	277.430	227.779	13.371
CHI_UZB	111.000	133.000	28.000	33.000	133.000	7.000	73.200	518.200	CHI_UZB	138.030	112.268	29.012
SUR_UZB	125.000	117.000	10.000	15.000	121.000	11.000	62.000	461.000	SUR_UZB	148.213	98.086	9.489
KAS_UZB	182.000	269.000	12.000	33.000	17.000	800	56.140	569.940	KAS_UZB	255.499	203.933	9.695
ZAR_UZB	272.000	291.000	33.700	46.000	202.100	820	181.030	1.026.650	ZAR_UZB	333.918	230.879	32.075
SOU_UZB	217.000	90.200	14.600	92.000	12.600	49.000	211.200	686.600	SOU_UZB	250.105	82.213	15.623
SYR_KAZ	39.215	12.658	447	22.089	5.957	1.241	25.440	107.047	SYR_KAZ	43.636	13.441	371
CHI_KAZ	17.636	5.693	201	9.934	2.679	558	11.441	48.142	CHI_KAZ	19.625	6.045	167
NOR_KAZ	101.149	46.649	8.152	95.976	16.664	71.201	104.519	444.310	NOR_KAZ	117.219	32.587	9.607
AMU_TUR	612.000	749.000	18.600	40.000	36.000	2.020	31.490	1.489.110	AMU_TUR	701.345	643.286	30.109
SOU_TUR	263.000	219.000	1.000	13.000	4.200	58.000	6.330	564.530	SOU_TUR	289.285	192.655	835
FER_KYR	40.500	37.400	13.300	57.700	26.361	5.500	154.968	335.729	FER_KYR	47.385	45.810	12.438
FER_TAD	29.797	92.099	11.738	35.214	26.185	4.515	43.503	243.051	FER_TAD	32.591	90.930	16.969
UPA_TAD	133.000	208.000	19.800	53.000	21.710	11.010	64.310	510.830	UPA_TAD	169.795	167.779	31.811
ZAR_TAD	3.203	9.901	1.262	3.786	2.815	485	4.677	26.129	ZAR_TAD	3.498	9.773	1.825
UPA_AFG	0	0	0	0	0	0	0	0	UPA_AFG	0	0	C
0	2.702.700	2.828.400	222.500	638.199	996.371	234.650	1.309.468	8.932.288	0	3.193.051	2,400,400	245.638

- 6. Ratio of value added to land use.
- 7. Ratio of value added to water use.

	d by water us	c, buschne, c	5507 10000	10					Funct address	ed by water use	, occuratio, oc
	cot	wht	ric	alf	veg	fru	oth	Total		cot	wht
FER_UZB	206	187	67	149	74	516	191	164	FER_UZB	203	184
SYR_UZB	157	79	66	22	7	101	33	89	SYR_UZB	148	73
CHI_UZB	249	105	71	44	68	494	192	136	CHI_UZB	237	99
SUR_UZB	213	140	66	48	38	102	151	134	SUR_UZB	205	133
KAS_UZB	133	23	12	17	-7	118	98	73	KAS_UZB	118	17
ZAR_UZB	162	95	50	80	36	78	145	112	ZAR_UZB	154	89
SOU_UZB	129	117	49	18	3	357	16	87	SOU_UZB	124	112
SYR_KAZ	139	206	34	40	12	36	65	99	SYR_KAZ	135	199
CHI_KAZ	142	212	27	37	13	37	62	98	CHI_KAZ	137	208
NOR KAZ	141	44	58	58	-2	5	6	62	NOR KAZ	136	42
AMU TUR	54	36	84	36	71	313	131	50	AMU TUR	51	33
SOU TUR	69	45	11	37	70	312	256	83	SOU_TUR	67	44
FER_KYR	302	471	62	75	-3	319	14	94	FER_KYR	285	446
FER_TAD	69	97	89	22	33	227	286	98	FER_TAD	66	93
UPA_TAD	91	26	117	23	4	352	214	73	UPA_TAD	83	22
ZAR_TAD	54	57	86	25	17	159	266	75	ZAR_TAD	52	54
UPA_AFG	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	UPA_AFG	#DIV/0!	#DIV/0!
All Green shac	119 led cells are h	70 ighest value,	66 , red shade	47 d cells are lo	43 west value (of	224 flexible crop	105 os)	92	All	114	69
All Green shac		70 ighest value,	66 , red shade	d cells are lo		flexible crop	os)	92		114 ed by land use, S	
All Green shac	ded cells are h ed by land use, cot	70 ighest value,	66 , red shade	d cells are lo alf	west value (of veg	flexible crop	os) oth	92 Total	Value adde	ed by land use, S cot	Scenario, USI
All Green shac	ded cells are h ed by land use,	70 ighest value, baseline, US	66 , red shade D/ha	d cells are lo	west value (of	flexible crop	os)		Value adde	ed by land use, S	Scenario, USI wht
All Green shad Value adde	ded cells are h ed by land use, cot	70 ighest value, baseline, US wht	66 , red shade D/ha ric	d cells are lo alf	west value (of veg	flexible crop	os) oth	Total	Value adde	ed by land use, S cot	Scenario, USI wht 1.062
All Green shac Value adde FER_UZB SYR_UZB CHI_UZB	ded cells are h ed by land use, cot 1.967	70 ighest value, baseline, US wht 1.079	66 , red shade D/ha ric 1.005	d cells are lo alf 1.733	west value (of veg 487	flexible crop fru 3.223	os) oth 1.627	Total 1.322	Value adde FER_UZB SYR_UZB CHI_UZB	ed by land use, S cot 1.937	Scenario, USI wht 1.062 436
All Green shad Value adde FER_UZB SYR_UZB	ded cells are h cot 1.967 1.640	70 ighest value baseline, US wht 1.079 470	66 , red shade D/ha ric 1.005 1.178	d cells are lo alf 1.733 250	west value (of veg 487 52	flexible crop fru 3.223 659	os) 0th 1.627 265	Total 1.322 724	Value adde FER_UZB SYR_UZB	ed by land use, 5 cot 1.937 1.554	Scenario, USI wht 1.062 436 565
All Green shac Value adde FER_UZB SYR_UZB CHI_UZB	ded cells are h cot 1.967 1.640 1.868	70 ighest value baseline, US wht 1.079 470 602	66 , red shade D/ha ric 1.005 1.178 1.143	d cells are lo alf 1.733 250 435 538 288	west value (of veg 487 52 445	flexible crop fru 3.223 659 3.248	oth 1.627 265 1.430	Total 1.322 724 1.004	Value adde FER_UZB SYR_UZB CHI_UZB	ed by land use, 5 cot 1.937 1.554 1.780 2.068 1.708	Scenario, US wht 1.062 436 565 771
All Green shac Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB	ded cells are h cot 1.967 1.640 1.868 2.150	70 ighest value baseline, US wht 1.079 470 602 808	66 , red shade D/ha 1.005 1.178 1.143 1.195	d cells are lo alf 1.733 250 435 538	west value (of veg 487 52 445 274	flexible crop fru 3.223 659 3.248 683	oth 1.627 265 1.430 1.253	Total 1.322 724 1.004 1.088	Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB	ed by land use, 5 cot 1.937 1.554 1.780 2.068	Scenario, US wht 1.062 436 565 771 132
All Green shad Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB	ded cells are h cot 1.967 1.640 1.868 2.150 1.920	70 ighest value baseline, US wht 1.079 470 602 808 182	66 , red shade <u>D/ha</u> <u>ric</u> 1.005 1.178 1.143 1.195 286	d cells are lo alf 1.733 250 435 538 288	west value (of veg 487 52 445 274 -57	flexible crop fru 3.223 659 3.248 683 883	oth 1.627 265 1.430 1.253 697	Total 1.322 724 1.004 1.088 790	Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB	ed by land use, 5 cot 1.937 1.554 1.780 2.068 1.708	Scenario, US wht 1.062 436 565 771 132 575
All Green shac Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB	ded cells are h cot 1.967 1.640 1.868 2.150 1.920 2.202	70 ighest value, baseline, US wht 1.079 470 602 808 182 615	66 , red shade D/ha 1.005 1.178 1.143 1.195 286 1.127	d cells are lo alf 1.733 250 435 538 288 1.271	vest value (of veg 487 52 445 274 -57 300	flexible crop fru 3.223 659 3.248 683 883 474	oth 1.627 265 1.430 1.253 697 1.074	Total 1.322 724 1.004 1.088 790 1.100	Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB	ed by land use, s cot 1.937 1.554 1.780 2.068 1.708 2.093	Scenario, US wht 1.062 436 565 771 132 575 751
All Green shac FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB	ded cells are h ed by land use, cot 1.967 1.640 1.868 2.150 1.920 2.202 1.566	70 ighest value, baseline, US wht 1.079 470 602 808 182 615 786	66 , red shade 7ic 1.005 1.178 1.143 1.143 1.195 286 1.127 1.276	d cells are lo alf 1.733 250 435 538 288 1.271 288	veg 487 52 445 274 -57 300 24	flexible crop fru 3.223 659 3.248 683 883 474 2.652	oth 1.627 265 1.430 1.253 697 1.074 112	Total 1.322 724 1.004 1.088 790 1.100 888	Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB	ed by land use, S cot 1.937 1.554 1.780 2.068 1.708 2.093 1.503	Scenario, US wht 1.062 436 565 771 132 575 751 1.378
All Green shac Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ	ded cells are h cot 1.967 1.640 1.868 2.150 1.920 2.202 1.566 1.610	70 ighest value baseline, US wht 1.079 470 602 808 182 615 786 1.417	66 , red shade 1.005 1.178 1.143 1.143 1.195 286 1.127 1.276 676	d cells are lo alf 1.733 250 435 538 288 1.271 288 504	veg 487 52 445 274 -57 300 24 97	flexible crop fru 3.223 659 3.248 683 883 474 2.652 261	oth 1.627 265 1.430 1.253 697 1.074 112 435	Total 1.322 724 1.004 1.088 790 1.100 888 976	Value adde FER_U2B SYR_U2B CHI_U2B SUR_U2B KAS_U2B ZAR_U2B SOU_U2B SYR_KAZ	ed by land use, 5 cot 1.937 1.554 1.780 2.068 1.708 2.093 1.503 1.562	Scenario, USI wht 1.062 436 565 771 132 575 751 1.378 1.378
All Green shac Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB XAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ	ded cells are h cot 1.967 1.640 1.868 2.150 1.920 2.202 1.566 1.610 1.610	70 ighest value baseline, US wht 1.079 470 602 808 182 615 786 1.417 1.417	66 , red shade D/ha ric 1.005 1.178 1.143 1.195 286 1.127 1.276 676 676 677	d cells are lo alf 1.733 250 435 538 288 1.271 288 504 504	veg 487 52 445 274 -57 300 24 97 97	flexible crop fru 3.223 659 3.248 683 883 474 2.652 261 262	oth 1.627 265 1.430 1.253 697 1.074 112 435 435	Total 1.322 724 1.004 1.088 790 1.100 888 976 976	Value adde FER_UZB SYR_UZB CH_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CH_KAZ	ed by land use, 5 cot 1.937 1.554 1.780 2.068 1.708 2.093 1.503 1.562	Scenario, US wht 1.062 436 565 771 132 575 751 1.378 1.378 1.378 292
All Green shace Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB XAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ	ded cells are h cot 1.967 1.640 1.868 2.150 1.920 2.202 1.566 1.610 1.610	70 ighest value baseline, US wht 1.079 470 602 808 182 615 786 1.417 1.417 311	66 , red shade D/ha 1.005 1.178 1.143 1.143 1.143 1.145 286 1.127 1.276 676 677 1.668	d cells are lo alf 1.733 250 435 538 288 1.271 288 504 504 504 973	vest value (of veg 487 52 445 274 -57 300 24 97 -14	flexible crop fru 3.223 659 3.248 683 883 474 2.652 261 262 36	oth 1.627 265 1.430 1.253 697 1.074 112 435 435 39	Total 1.322 724 1.004 1.088 790 1.100 888 976 976 654	Value adde FER_UZB SYR_UZB CH_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ	ed by land use, 5 cot 1.937 1.554 1.780 2.068 1.708 2.093 1.503 1.562 1.562 1.552	Scenario, USI 1.062 436 565 771 132 575 751 1.378 1.378 292 241
All Green shac Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ CHI_KAZ AMU_TUR	ded cells are h cot 1.967 1.640 1.868 2.150 1.920 2.202 1.566 1.610 1.610 882	70 ighest value, baseline, US wht 1.079 470 602 808 182 615 786 1.417 1.417 1.417 1.417 311 257	66 , red shade D/ha 1.005 1.178 1.143 1.143 1.143 2.86 1.127 1.276 676 677 1.668 2.261	d cells are lo alf 1.733 250 435 538 288 1.271 288 504 504 973 824	vest value (ol 487 52 4487 274 -57 300 24 97 97 -14 603	flexible crop fru 3.223 659 3.248 683 883 474 2.652 261 262 262 36 2.636	oth 1.627 265 1.430 1.253 697 1.074 112 435 435 39 1.029	Total 1.322 724 1.004 1.088 790 1.100 888 976 976 976 654 582	Value adde FER_U2B SYR_U2B CH_U2B SUR_U2B KAS_U2B SOU_U2B SYR_KAZ CH_KAZ NOR_KAZ AMU_TUR	ed by land use, 5 cot 1.937 1.554 1.780 2.068 1.708 2.093 1.503 1.562 1.562 1.562 845	Scenario, USI wht 1.062 436 565 771 132 575 751 1.378 1.378 1.378 292 241 360
All Green shac Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB SUR_UZB SALUZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR SOU_TUR	ded cells are h cot 1.967 1.640 1.868 2.150 1.920 2.202 1.566 1.610 1.610 1.610 882 882	70 ighest value baseline, US wht 1.079 470 602 808 182 615 786 1.417 1.417 311 257 369	66 , red shade D/ha ric 1.005 1.178 1.143 1.195 286 1.127 1.276 676 677 1.276 677 1.2668 2.261 286	d cells are lo alf 1.733 250 435 538 288 1.271 288 504 504 973 824 673	vest value (ol veg 487 52 445 274 -57 300 24 97 97 -14 603 586	flexible crop fru 3.223 659 3.248 683 883 474 2.652 2.61 2.62 36 2.636 2.854	oth 1.627 265 1.430 1.253 697 1.074 112 435 435 39 1.029 1.938	Total 1.322 724 1.004 1.088 790 1.100 888 976 976 976 654 582 890	Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB SOU_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ NOR_KAZ AMU_TUR SOU_TUR	ed by land use, 5 cot 1.937 1.554 1.780 2.068 1.708 2.093 1.503 1.503 1.562 1.552 1.552 1.552 8.45 865	Scenario, USI wht 1.062 436 565 771 132 575 751 1.378 1.378 292 241 360 1.733
All Green shac Value adde FFR_UZB SYR_UZB CHI_UZB SUR_UZB SUR_UZB XAS_UZB SOU_UZB SYR_KAZ CHI_KAZ CHI_KAZ CHI_KAZ CHI_KAZ MOR_KAZ AMU_TUR SOU_TUR	ded cells are h cot 1.967 1.640 1.868 2.150 1.920 2.202 1.566 1.610 1.610 1.610 1.610 882 882 1.640	70 ighest value, baseline, US wht 1.079 470 602 808 808 808 182 615 786 1.417 1.417 311 257 369 1.825	66 , red shade D/ha 1.005 1.178 1.143 1.143 1.195 286 1.127 1.276 676 677 1.668 2.261 2.261 2.264 903	d cells are lo alf 1.733 250 435 538 288 1.271 288 504 504 973 824 673 422	vest value (of 487 52 445 274 -57 300 24 97 97 -14 603 586 -14	flexible crop fru 3.223 659 3.248 683 883 474 2.652 261 262 261 262 36 2.636 2.636 2.854 1.277	oth 1.627 265 1.430 1.253 697 1.074 112 435 435 39 1.029 1.938 92	Total 1.322 724 1.004 1.088 790 1.100 888 976 976 654 582 890 572	Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB XAS_UZB ZAR_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR FER_KYR	ed by land use, 5 cot 1.937 1.554 1.780 2.068 1.708 2.093 1.503 1.562 1.562 1.562 1.552 845 865 1.548	Scenario, USI wht 1.062 436 565 771 132 575 751 1.378 1.378 1.378 292 241 360 1.733 607
All Green shac Value adde FER_UZB SYR_UZB CHI_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ SOU_TUR FER_TAD UPA_TAD	ded cells are h cot 1.967 1.640 1.868 2.150 2.202 1.566 1.610 1.610 882 882 1.640	70 ighest value, baseline, US wht 1.079 470 602 808 182 615 786 1.417 1.417 1.417 1.417 3.69 1.825 632	66 , red shade D/ha ric 1.078 1.178 1.143 1.195 286 1.127 1.276 677 1.266 677 677 1.668 2.261 2.86 903 1.838	d cells are lo alf 1.733 250 435 538 288 1.271 288 504 504 973 824 673 422 288	vest value (of veg 487 52 445 274 -57 300 24 97 -14 603 586 -14 258	flexible crop fru 3.223 659 3.248 683 883 474 2.652 261 262 36 2.636 2.854 1.277 1.961	oth 1.627 265 1.430 1.253 697 1.074 112 435 435 39 1.029 1.938 92 2.045	Total 1.322 724 1.004 1.088 790 1.100 888 976 654 582 890 572 908	Value adde FER_U2B SYR_U2B CHI_U2B SUR_U2B KAS_U2B SOU_U2B SYR_KAZ CHI_KAZ CHI_KAZ CHI_KAZ AMU_TUR SOU_TUR FER_KYR FER_TAD UPA_TAD	ed by land use, 5 cot 1.937 1.554 1.780 2.068 1.708 2.093 1.503 1.562 1.552 845 865 1.548 846	Scenario, USC wht 1.062 436 565 771 132 575 751 1.378 292 241 360 1.733 607 245 607
All Green shac Value adde FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ CHI_KAZ AMU_TUR SOU_TUR FER_KYR FER_TAD	ded cells are h ed by land use, cot 1.967 1.640 1.868 2.150 1.920 2.202 1.566 1.610 1.610 1.610 1.610 882 882 1.640 882 1.450	70 ighest value, baseline, US wht 1.079 470 602 808 182 615 786 1.417 1.417 1.417 311 257 369 1.825 632 632	66 , red shade D/ha ric 1.005 1.178 1.143 1.195 286 1.127 1.276 676 677 1.668 2.261 286 903 1.838 2.542	d cells are lo alf 1.733 250 435 538 288 1.271 288 504 504 973 824 673 824 673 824 673 824	vest value (ol 487 52 445 274 -57 300 24 97 97 -14 603 586 -14 258 59	flexible crop fru 3.223 659 3.248 683 883 474 2.652 261 262 261 262 36 2.636 2.854 1.277 1.961 4.602	oth 1.627 265 1.430 1.253 697 1.074 112 435 435 39 1.029 1.938 92 2.045 1.530	Total 1.322 724 1.004 1.088 790 1.100 888 976 976 976 976 976 976 976 976	Value adde FER_U2B SYR_U2B CH_U2B SUR_U2B KAS_U2B SOU_U2B SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR SOU_TUR SOU_TUR FER_KYR FER_TAD	ed by land use, 5 cot 1.937 1.554 1.780 2.068 1.708 2.093 1.503 1.562 1.552 1.552 1.552 8.45 8.45 1.548 8.46 1.324	Scenario, USC wht 1.062 436 565 771 132 575 751 1.378 1.378 1.378 292 241 360 1.733 607 245

Green shaded cells are highest value, red shaded cells are lowest value (of flexible crops)

8. Yield.

8

9

9. Water intensity.

menaj base	line, ton/ha								Yield, Scen	ario, ton/ha	
	cot	wht	ric	alf	veg	fru	oth	Total		cot	wht
FER_UZB	2,6	5,0	2,4	19,5	27,5	8,1	25,9	13,2	FER_UZB	2,6	4,9
SYR_UZB	2,3	3,0	2,8	4,6	16,6	2,4	7,7	5,5	SYR_UZB	2,2	2,8
CHI_UZB	2,5	3,4	2,7	6,5	26,5	8,1	23,2	12,1	CHI_UZB	2,4	3,3
SUR_UZB	2,8	4,1	2,8	7,5	22,2	2,4	20,9	10,8	SUR_UZB	2,7	4,0
KAS_UZB	2,5	2,0	1,0	5,0	13,9	2,9	13,5	3,8	KAS_UZB	2,3	1,8
ZAR_UZB	2,8	3,4	2,7	14,8	22,8	2,0	18,5	10,2	ZAR_UZB	2,7	3,3
SOU_UZB	2,2	4,0	3,0	5,0	16,0	6,8	5,6	4,5	SOU_UZB	2,1	3,9
SYR_KAZ	2,2	6,1	1,8	7,2	17,8	1,5	10,0	6,4	SYR_KAZ	2,2	6,0
CHI_KAZ	2,2	6,1	1,8	7,2	17,8	1,5	10,0	6,4	CHI_KAZ	2,2	6,0
NOR_KAZ	2,2	2,4	3,8	11,8	15,0	1,0	4,7	5,2	NOR_KAZ	2,2	2,4
AMU_TUR	1,5	2,3	5,0	10,4	30,4	6,8	17,9	3,2	AMU_TUR	1,5	2,2
SOU_TUR	1,5	2,6	1,0	8,8	30,0	7,3	30,0	3,2	SOU_TUR	1,5	2,6
FER_KYR	2,3	7,5	2,2	6,3	15,0	3,8	5,4	6,0	FER_KYR	2,2	7,2
FER_TAD	1,5	3,5	4,1	5,0	21,8	5,3	31,4	10,5	FER_TAD	1,5	3,4
UPA_TAD	2,1	2,4	5,5	5,5	16,8	11,1	24,6	6,3	UPA_TAD	1,9	2,2
ZAR_TAD	1,5	3,5	4,1	5,0	21,8	5,3	31,4	10,5	ZAR_TAD	1,5	3,4
UPA_AFG	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	UPA_AFG	#DIV/0!	#DIV/0!
All Water inte	2,1 ensity, baseline		3,1	8,8	23,3	4,9	14,5	7,2	All Water inte	2,1 nsity, Scenario,	
			3,1 ric	8,8 alf	23,3 veg	4,9 fru	14,5 oth	7,2 Total			
Water inte	ensity, baseline	, m3/ha							Water inte	nsity, Scenario,	m3/ha
Water inte	ensity, baseline	, m3/ha wht	ric	alf	veg	fru	oth	Total	Water inte	nsity, Scenario, cot	m3/ha wht
Water inte FER_UZB SYR_UZB	ensity, baseline cot 9.562 10.476 7.514	, m3/ha wht 5.757	ric 15.013	alf 11.664	veg 6.579	fru 6.250	oth 8.502	Total 8.073	Water inte	nsity, Scenario, cot 9.560	m3/ha wht 5.759
Water inte FER_UZB SYR_UZB CHI_UZB	ensity, baseline cot 9.562 10.476	, m3/ha wht 5.757 5.956	ric 15.013 17.787	alf 11.664 11.313	veg 6.579 7.179	fru 6.250 6.506	oth 8.502 8.001	Total 8.073 8.157	Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB	nsity, Scenario, cot 9.560 10.475	m3/ha wht 5.759 5.958
Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB	nsity, baseline cot 9.562 10.476 7.514 10.088 14.473	, m3/ha wht 5.757 5.956 5.714	ric 15.013 17.787 16.214	alf 11.664 11.313 9.848	veg 6.579 7.179 6.534	fru 6.250 6.506 6.571	oth 8.502 8.001 7.432 8.290 7.143	Total 8.073 8.157 7.395 8.106 10.754	Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB	nsity, Scenario, cot 9.560 10.475 7.513	m3/ha wht 5.759 5.958 5.718 5.781 7.782
Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB	ensity, baseline cot 9.562 10.476 7.514 10.088 14.473 13.610	, m3/ha 5.757 5.956 5.714 5.778	ric 15.013 17.787 16.214 18.000	alf 11.664 11.313 9.848 11.200 17.273 15.913	veg 6.579 7.179 6.534 7.140	fru 6.250 6.506 6.571 6.727	oth 8.502 8.001 7.432 8.290	Total 8.073 8.157 7.395 8.106	Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB	nsity, Scenario, cot 9.560 10.475 7.513 10.087	m3/ha wht 5.759 5.958 5.718 5.781 7.782 6.445
Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB	nsity, baseline cot 9.562 10.476 7.514 10.088 14.473	, m3/ha 5.757 5.956 5.714 5.778 7.784	ric 15.013 17.787 16.214 18.000 23.333	alf 11.664 11.313 9.848 11.200 17.273	veg 6.579 7.179 6.534 7.140 8.471	fru 6.250 6.506 6.571 6.727 7.500	oth 8.502 8.001 7.432 8.290 7.143	Total 8.073 8.157 7.395 8.106 10.754	Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB	nsity, Scenario, 9.560 10.475 7.513 10.087 14.474 13.608 12.143	m3/ha wht 5.759 5.958 5.718 5.781 7.782
Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ	cot 9.562 10.476 7.514 10.088 14.473 13.610 12.143 11.552	, m3/ha wht 5.757 5.956 5.714 5.778 6.443 6.718 6.873	ric 15.013 17.787 16.214 18.000 23.333 22.760 26.027 20.134	alf 11.664 11.313 9.848 11.200 17.273 15.913 16.217 12.450	veg 6.579 7.179 6.534 7.140 8.471 8.283 8.889 7.890	fru 6.250 6.506 6.571 6.727 7.500 6.098 7.429 7.252	oth 8.502 8.001 7.432 8.290 7.143 7.430 6.856 6.722	Total 8.073 8.157 7.395 8.106 10.754 9.838 10.249 9.818	Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ	nsity, Scenario, 9.560 10.475 7.513 10.087 14.474 13.608 12.143 11.550	m3/ha wht 5.759 5.958 5.718 5.781 7.782 6.445 6.714 6.919
Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ	nsity, baseline cot 9.562 10.476 7.514 10.088 14.473 13.610 12.143 11.552 11.340	, m3/ha wht 5.757 5.956 5.714 5.778 7.784 6.443 6.718 6.873 6.873 6.675	ric 15.013 17.787 16.214 18.000 23.333 22.760 26.027	alf 11.664 11.313 9.848 11.200 17.273 15.913 16.217 12.450 13.489	veg 6.579 7.179 6.534 7.140 8.471 8.283 8.889 7.890 7.465	fru 6.250 6.506 6.571 6.727 7.500 6.098 7.429 7.252 7.168	oth 8.502 8.001 7.432 8.290 7.143 7.430 6.856 6.722 6.992	Total 8.073 8.157 7.395 8.106 10.754 9.838 10.249 9.818 9.991	Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SOU_UZB SYR_KAZ CHI_KAZ	nsity, Scenario, 9.560 10.475 7.513 10.087 14.474 13.608 12.143	m3/ha wht 5.759 5.958 5.718 5.781 7.782 6.445 6.714 6.919 6.617
Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB XAR_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ	ensity, baseline 	, m3/ha wht 5.757 5.956 5.714 5.778 7.784 6.443 6.718 6.873 6.675 7.010	ric 15.013 17.787 16.214 18.000 23.333 22.760 26.027 20.134 24.876 28.582	alf 11.664 11.313 9.848 11.200 17.273 15.913 16.217 12.450 13.489 16.713	veg 6.579 7.179 6.534 7.140 8.471 8.283 8.889 7.890 7.465 7.561	fru 6.250 6.506 6.571 6.727 7.500 6.098 7.429 7.252 7.168 7.430	oth 8.502 8.001 7.432 8.290 7.143 7.430 6.856 6.722 6.992 6.860	Total 8.073 8.157 7.395 8.106 10.754 9.838 10.249 9.818 9.991 10.560	Water inte FER_U2B SYR_U2B CHI_U2B KAS_U2B ZAR_U2B SOU_U2B SYR_KAZ CHI_KAZ NOR_KAZ	nsity, Scenario, cot 9.560 10.475 7.513 10.087 14.474 13.608 12.143 11.550 11.363 11.432	m3/ha wht 5.759 5.958 5.718 5.781 7.782 6.445 6.714 6.919 6.617 6.997
Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB XAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR	nsity, baseline cot 9.562 10.476 7.514 10.088 14.473 13.610 12.143 11.552 11.340 11.429 16.418	, m3/ha wht 5.757 5.956 5.714 5.778 7.784 6.443 6.718 6.873 6.873 6.675	ric 15.013 17.787 16.214 18.000 23.333 22.760 26.027 20.134 24.876	alf 11.664 11.313 9.848 11.200 17.273 15.913 16.217 12.450 13.489 16.713 22.850	veg 6.579 7.179 6.534 7.140 8.471 8.283 8.889 7.890 7.465	fru 6.250 6.506 6.571 6.727 7.500 6.098 7.429 7.252 7.168 7.430 8.416	oth 8.502 8.001 7.432 8.290 7.143 6.856 6.722 6.856 6.722 6.992 6.860 7.844	Total 8.073 8.157 7.395 8.106 10.754 9.838 10.249 9.818 9.991 10.560 11.692	Water inte FER_U2B SYR_U2B CHI_U2B SUR_U2B XAR_U2B ZAR_U2B SOU_U2B SYR_KA2 CHI_KA2 NOR_KA2 AMU_TUR	nsity, Scenario, cot 9.560 10.475 7.513 10.087 14.474 13.608 12.143 11.550 11.363 11.452 16.418	m3/ha wht 5.759 5.958 5.718 5.781 7.782 6.445 6.714 6.919 6.617
Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB XAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR SOU_TUR	ensity, baseline <u>cot</u> 9.562 10.476 7.514 10.088 14.473 13.610 12.143 11.552 11.340 11.429 16.418 12.817	, m3/ha wht 5.757 5.956 5.714 5.778 7.784 6.443 6.718 6.873 6.675 7.010 7.183 8.137	ric 15.013 17.787 16.214 18.000 23.333 22.760 26.027 20.134 24.876 28.582 26.828 26.828 26.000	alf 11.664 11.313 9.848 11.200 17.273 15.913 16.217 12.450 13.489 16.713 22.850 18.308	veg 6.579 7.179 6.534 7.140 8.471 8.283 8.889 7.890 7.465 7.561 8.500 8.333	fru 6.250 6.506 6.571 6.727 7.500 6.098 7.429 7.429 7.252 7.168 7.430 8.416 9.155	oth 8.502 8.001 7.432 8.290 7.143 7.430 6.856 6.722 6.992 6.860 7.844 7.583	Total 8.073 8.157 7.395 8.106 10.754 9.838 10.249 9.818 9.991 10.560 11.692 10.683	Water inte FER_UZB SYR_UZB CHI_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ NOR_KAZ NOR_KAZ NOR_KAZ NOR_KAZ NOTUR	nsity, Scenario, cot 9.560 10.475 7.513 10.087 14.474 13.608 12.143 11.550 11.363 11.452 16.418 12.818	m3/ha wht 5.759 5.958 5.718 5.781 7.782 6.445 6.714 6.919 6.617 6.919 6.617 6.917 7.183 8.139
Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR FER_KYR	ensity, baseline cot 9.562 10.476 7.514 10.088 14.473 13.610 12.143 11.552 11.340 11.429 16.418 12.817 5.432	, m3/ha wht 5.757 5.956 5.714 5.778 6.443 6.718 6.675 7.010 7.183 8.137 3.877	ric 15.013 17.787 16.214 18.000 23.333 22.760 26.027 20.134 24.876 28.582 26.828 26.000 14.586	alf 11.664 11.313 9.848 11.200 17.273 15.913 16.217 12.450 13.489 16.713 22.850 18.308 5.615	veg 6.579 7.179 6.534 7.140 8.471 8.283 8.889 7.890 7.465 7.561 8.500 8.333 4.818	fru 6.250 6.506 6.571 7.500 6.098 7.429 7.252 7.168 7.430 8.416 9.155 4.000	oth 8.502 8.001 7.432 8.290 7.143 7.430 6.856 6.722 6.992 6.860 7.844 7.583 6.569	Total 8.073 8.157 7.395 8.106 10.754 9.838 10.249 9.818 9.991 10.560 11.692 10.683 6.106	Water inte FER_U2B SYR_U2B CHI_U2B KAS_U2B XAR_U2B SUR_U2B SVR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ AMU_TUR FER_KYR	nsity, Scenario, cot 9.560 10.475 7.513 10.087 14.474 13.608 12.143 11.550 11.363 11.432 16.418 12.818 5.424	m3/ha wht 5.759 5.958 5.718 5.781 7.782 6.445 6.714 6.917 6.997 7.183 8.139 3.886
Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR SOU_TUR FER_KYR FER_TAD	nsity, baseline cot 9.562 10.476 7.514 10.088 14.473 13.610 12.143 11.552 11.340 11.429 16.418 12.817 5.432 2.753	, m3/ha wht 5.757 5.956 5.714 5.778 6.718 6.443 6.443 6.675 7.010 7.183 8.137 3.877 6.547	ric 15.013 17.787 16.214 18.000 23.333 22.760 26.027 20.134 24.876 28.582 26.828 26.828 26.000 14.586 20.702	alf 11.664 11.313 9.848 11.200 17.273 15.913 16.217 12.450 13.489 16.713 22.850 18.308 5.615 13.290	veg 6.579 7.179 6.534 7.140 8.471 8.283 8.889 7.890 7.465 7.561 8.500 8.333 4.818 7.867	fru 6.250 6.506 6.571 6.727 7.500 6.098 7.429 7.252 7.168 7.430 8.416 9.155 4.000 8.638	oth 8.502 8.001 7.432 8.290 7.143 7.430 6.856 6.722 6.992 6.860 7.844 7.583	Total 8.073 8.157 7.395 8.106 10.754 9.838 10.249 9.818 9.991 10.560 11.692 10.683	Water inte FER_UZB SYR_UZB CHI_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ NOR_KAZ NOR_KAZ NOR_KAZ NOR_KAZ NOTUR	nsity, Scenario, cot 9.560 10.475 7.513 10.087 14.474 13.608 12.143 11.550 11.363 11.452 16.418 12.818 12.818 5.424 12.734	m3/ha wht 5.759 5.958 5.718 5.781 7.782 6.445 6.714 6.919 6.617 6.919 6.617 6.919 7.183 8.139 3.886 6.543
Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR SOU_TUR FER_KYR FER_TAD UPA_TAD	nsity, baseline <u>cot</u> 9.562 10.476 7.514 10.088 14.473 13.610 12.143 11.552 11.340 11.429 16.418 12.817 5.432 12.753 15.902	, m3/ha wht 5.757 5.956 5.714 5.778 6.443 6.718 6.675 7.010 7.183 8.137 3.877	ric 15.013 17.787 16.214 18.000 23.333 22.760 26.027 20.134 24.876 28.582 26.828 26.000 14.586 20.702 21.717	alf 11.664 11.313 9.848 11.200 17.273 15.913 16.217 12.450 13.489 16.713 22.850 18.308 5.615	veg 6.579 7.179 6.534 7.140 8.471 8.283 8.889 7.890 7.465 7.561 8.500 8.333 4.818 7.867 13.312	fru 6.250 6.506 6.571 6.727 7.500 6.098 7.429 7.252 7.168 7.430 8.416 9.155 4.000 8.638 13.079	oth 8.502 8.001 7.432 8.290 7.143 7.430 6.856 6.722 6.992 6.860 7.844 7.583 6.559 7.149 7.137	Total 8.073 8.157 7.395 8.106 10.754 9.838 10.249 9.818 9.991 10.560 11.692 10.683 6.106 9.257 12.726	Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB XAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ CHI_KAZ CHI_KAZ AMU_TUR SOU_TUR FER_KYR FER_TAD UPA_TAD	nsity, Scenario, cot 9.560 10.475 7.513 10.087 14.474 13.608 12.143 11.550 11.363 11.432 16.418 12.818 5.424 12.734 15.902	m3/ha wht 5.759 5.958 5.718 5.781 7.782 6.445 6.714 6.919 6.617 6.997 7.183 8.139 3.886 6.543 10.919
Water inte FER_U2B SYR_U2B CHI_U2B SUR_U2B KAS_U2B ZAR_U2B SOU_U2B SOU_U2B SOU_U2B SOU_U2B SOU_TUR SOU_TUR FER_KYR FER_TAD UPA_TAD ZAR_TAD	ensity, baseline cot 9.562 10.476 7.514 10.088 14.473 13.610 12.143 11.552 11.340 11.429 16.418 12.817 5.432 12.753 15.902 16.225 2.625	, m3/ha wht 5.757 5.956 5.714 5.778 6.443 6.873 6.675 7.010 7.183 8.137 3.877 6.547 10.918 11.110	ric 15.013 17.787 16.214 18.000 23.333 22.760 26.027 20.134 24.876 28.582 26.828 26.828 26.828 26.000 14.586 20.702 21.717 21.395	alf 11.664 11.313 9.848 11.200 17.273 15.913 16.217 12.450 13.489 16.713 22.850 13.489 16.713 22.850 13.489 16.713 22.850 13.489 16.713 22.850 13.489 16.713 22.850 18.308 5.615 13.290 14.962 11.358	veg 6.579 7.179 6.534 7.140 8.471 8.283 8.889 7.890 7.465 7.561 8.500 8.333 4.818 7.867 13.312 14.920	fru 6.250 6.506 6.571 7.500 6.098 7.429 7.252 7.168 7.430 8.416 9.155 4.000 8.638 13.079 12.371	oth 8.502 8.001 7.432 8.290 7.143 7.430 6.856 6.722 6.992 6.860 7.844 7.583 6.569 7.149 7.137 7.697	Total 8.073 8.157 7.395 8.106 10.754 9.838 10.249 9.818 9.991 10.560 11.692 10.683 6.106 9.257 12.726 12.094	Water inte FER_U2B SYR_U2B SYR_U2B SUR_U2B KAS_U2B ZAR_U2B SOU_U2B SYR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI_KAZ NOR_KAZ CHI CHI CHI CHI CHI CHI CHI CHI CHI CHI	nsity, Scenario, cot 9,560 10.475 7,513 10.087 14.474 13,608 12,143 11,550 11,363 11,432 16,418 12,818 5,424 12,734 15,902 16,295	m3/ha wht 5.759 5.958 5.781 7.782 6.445 6.714 6.919 6.617 6.997 7.183 8.139 3.886 6.543 10.919 11.153
Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB KAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ NOR_KAZ AMU_TUR SOU_TUR FER_KYR FER_TAD UPA_TAD	nsity, baseline <u>cot</u> 9.562 10.476 7.514 10.088 14.473 13.610 12.143 11.552 11.340 11.429 16.418 12.817 5.432 12.753 15.902	, m3/ha wht 5.757 5.956 5.714 5.778 7.784 6.443 6.873 6.675 7.010 7.183 8.137 3.877 6.547 10.918 11.110	ric 15.013 17.787 16.214 18.000 23.333 22.760 26.027 20.134 24.876 28.582 26.828 26.000 14.586 20.702 21.717	alf 11.664 11.313 9.848 11.200 17.273 15.913 16.217 12.450 13.489 16.713 22.850 18.308 5.615 13.290 14.962	veg 6.579 7.179 6.534 7.140 8.471 8.283 8.889 7.890 7.465 7.561 8.500 8.333 4.818 7.867 13.312	fru 6.250 6.506 6.571 7.500 6.098 7.429 7.252 7.168 7.430 8.416 9.155 4.000 8.638 13.079 12.371	oth 8.502 8.001 7.432 8.290 7.143 7.430 6.856 6.722 6.992 6.860 7.844 7.583 6.559 7.149 7.137	Total 8.073 8.157 7.395 8.106 10.754 9.838 10.249 9.818 9.991 10.560 11.692 10.683 6.106 9.257 12.726	Water inte FER_UZB SYR_UZB CHI_UZB SUR_UZB XAS_UZB ZAR_UZB SOU_UZB SYR_KAZ CHI_KAZ CHI_KAZ CHI_KAZ AMU_TUR SOU_TUR FER_KYR FER_TAD UPA_TAD	nsity, Scenario, cot 9.560 10.475 7.513 10.087 14.474 13.608 12.143 11.550 11.363 11.432 16.418 12.818 5.424 12.734 15.902	m3/ha wht 5.759 5.958 5.718 5.781 7.782 6.445 6.714 6.919 6.617 6.997 7.183 8.139 3.886 6.543 10.919 11.153

Charts are also available for all tables presented in this section.

How to view information about reservoir operations

Information about reservoir operations is available on the "reservoirs" worksheet. The following types of information are available:

1. Reservoir discharges, aggregated by country.

	Discharges by country,	baseline, mm3/m	onth												Discharges by country, S	cenario, mm3/mor	th	
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			Oct	Nov	Dec
	Kyrgistan	834	1.295	1.075	1.268	1.461	1.690	1.637	1.227	1.346	892	745	731	KYR	Kyrgistan	683	1.856	2.047
	Tadjikstan	5.830	5.199	4.208	4.222	3.461	3.995	4.226	5.432	4.725	4.207	4.368	4.690	TAD	Tadjikstan	4.335	5.515	4.237
• •	Turkmenistan	190	907	139	1.415	1.799	141	1.397	2.995	5.209	2.095	2.520	268	TUR	Turkmenistan	196	799	139
	Uzbekistan	2.598	4.618	3.789	5.007	5.769	4.487	3.299	5.856	7.550	6.350	5.288	3.558	UZB	Uzbekistan	2.828	4.485	3.810
	Kazakhstan	1.415	1.369	1.379	1.350	1.632	1.604	1.370	1.718	1.350	1.418	1.369	1.350	KAZ	Kazakhstan	1.415	1.369	1.379
	Total	10.867	13.388	10.590	13.262	14.122	11.917	11.929	17.228	20.180	14.962	14.290	10.597		Total	9.457	14.024	11.612

2. Reservoir storage changes, aggregated by river section.

Reservoir change by sectio	n, baseline, mn	n3/month											Reservoir change by sect	ion, Scenario, mm3	/month	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		Oct	Nov	Dec
Upper Syrdarya	-409	717	451	-1.070	-1.648	-1.030	-778	62	2.494	1.682	892	367	Upper Syrdarya	-259	34	-777
Middle Syrdarya	-140	1.236	702	-215	-882	879	191	370	-47	-728	-757	-608	Middle Syrdarya	-348	1.996	1.651
Lower Syrdarya	42	0	0	135	-135	0	237	-237	42	-42	-33	-9	Lower Syrdarya	807	0	0
Upper Amudarya	-2.659	1.480	29	-1.455	-688	-826	-90	527	3.423	2.675	2.311	-453	Upper Amudarya	-1.164	1.164	0
Middle Amudarya	2.453	3.023	1.218	-2.352	-4.408	-35	538	-204	-3.518	2.118	98	1.067	Middle Amudarya	852	3.685	1.245
Lower Amudarya	0	0	0	0	0	0	0	0	0	0	0	0	Lower Amudarya	0	0	0
Total	-713	6.456	2.400	-4.957	-7.761	-1.012	98	518	2.394	5.705	2.511	364	Total	-112	6.879	2.119
Iotal	-/15	0.450	2.400	-4.957	-7.701	-1.012	98	219	2.594	5.705	2.511	504	Total	-112	0.879	2.119

3. Reservoir volumes, aggregated by river section.

		Reservoir volume,	baseline, n	nm3/month	1												Reservoir volume, Scenari	o, mm3/month		
			Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep			Oct	Nov	Dec
		Lower Amudarya	2.145	0	0	0	0	0	0	0	0	0	0	0	0	-2145	Lower Amudarya	0	0	0
		Lower Syrdarya	5645	6.960	6.960	6.960	7.095	6.960	6.960	7.197	6.960	7.002	6.960	6.927	6.918	1273	Lower Syrdarya	6.960	6.960	6.960
2	- 1	Middle Amudaryi	17.807	12.823	15.846	17.064	14.712	10.305	10.270	10.809	10.604	7.087	9.203	9.303	10.370	-7437	Middle Amudarya	11.681	15.367	16.613
		Middle Syrdarya	7.326	5.643	6.879	7.581	7.366	6.483	7.362	7.553	7.923	7.876	7.148	6.391	5.783	-1543	Middle Syrdarya	4.849	6.845	8.495
Ŭ		Upper Amudarya	29.509	5.738	8.021	7.963	7.065	6.141	5.244	4.536	3.367	2.826	3.248	4.200	4.757	-24752	Upper Amudarya	6.906	8.070	8.070
		Upper Syrdarya	27.929	20.617	20.994	21.156	20.890	19.544	18.548	17.665	16.731	16.839	16.931	18.029	19.604	-8325	Upper Syrdarya	21.037	21.071	20.294
		Total	90361	51.781	58.700	60.724	57.128	49.433	48.384	47.760	45.585	41.630	43.490	44.850	47.432	-42929	Total	51.433	58.313	60.432

4. Reservoir volumes, disaggregated by individual reservoir.

Baseline reserv	voir volume, m	m3													Scenario reserv	oir volume, mm	3/month		
ResVol	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Change		Sep	Oct	Nov	_
Res_KAM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Res_KAM	0	0	0	
Res_TOK	19.230	19.015	19.301	19.153	19.088	18.334	17.194	16.195	15.328	14.543	14.733	16.115	17.808	-1.422	Res_TOK	19499	19.435	19.500	
Res_AND	1751	1.557	1.526	1.408	1.224	1.033	885	875	1.189	1.701	1.900	1.869	1.751	0	Res_AND	1751	1.557	1.526	
Res_KAR	2718	2.692	3.350	3.350	3.350	3.105	3.350	3.350	3.350	3.350	3.350	3.350	2.719	1	Res_KAR	2134	1.959	3.350	
Res_CHA	2010	1.781	2.010	2.010	1.739	1.017	802	865	1.552	1.867	2.010	2.010	2.010	0	Res_CHA	2010	1.781	2.010	
Res_SHA	5128	5.200	5.200	5.200	5.200	5.200	5.200	5.200	5.200	5.200	5.200	5.167	5.129	1	Res_SHA	4364	5.200	5.200	
Res_ROG	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Res_ROG	0	0	0	
Res_NUR	7457	5.250	7.081	7.023	6.745	5.776	4.924	3.906	3.047	2.506	2.797	3.260	3.817	-3.640	Res_NUR	7130	6.455	7.130	
Res_TMP	1091	1.242	997	1.290	974	1.290	909	1.290	1.117	1.014	1.189	1.133	1.091	0	Res_TMP	1200	1.065	1.200	
Res_TMR	3537	5.700	5.700	6.510	6.510	4.495	3.870	3.870	3.555	2.268	2.268	2.268	3.537	0	Res_TMR	3337	4.998	5.174	
Res_DAS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Res_DAS	0	0	0	
Res_ZAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Res_ZAR	0	0	0	
Res_FER	45	45	167	595	578	177	469	595	214	595	298	45	45	0	Res_FER	45	45	45	
Res_AHA	54	69	114	137	148	160	210	343	31	31	129	31	54	0	Res_AHA	53	68	113	
Res_ARN	1000	1.101	1.405	2.084	2.129	2.201	3.000	2.995	2.990	2.628	1.659	1.000	1.000	0	Res_ARN	1000	1.041	1.372	
Res_KOK	1750	1.750	1.750	1.750	1.750	1.750	1.750	1.750	1.750	1.750	1.750	1.750	1.750	0	Res_KOK	1750	1.750	1.750	
	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	
Res_KAF	940	488	940	940	320	365	320	630	320	320	451	940	940	0	Res_KAF	940	451	940	
Res_ZD	482	947	2.200	2.200	2.171	994	994	903	2.149	400	729	750	482	0	Res_ZD	1330	1.134	2.200	
Res_TUR	1720	1.831	1.914	2.000	806	400	666	1.319	1.712	1.445	1.551	1.634	1.720	0	Res_TUR	1544	1.655	1.738	
Res_SUR	779	823	862	883	611	607	116	273	116	469	720	759	779	0	Res_SUR	883	862	883	
Res_KAS	757	762	769	777	803	464	579	460	650	702	742	749	757	0	Res_KAS	757	762	769	
Res_TAL	125	125	1.525	1.525	1.100	1.391	1.391	1.525	641	125	125	131	125	0	Res_TAL	247	125	1.524	
Res_BUK	1880	1.393	1.879	1.879	1.737	664	1.745	1.169	664	664	1.879	1.879	1.879	-1	Res_BUK	1531	1.080	1.879	
Res_NAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Res_NAR	0	0	0	
Res_FAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Res_FAR	0	0	0	
Res_VAH	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Res_VAH	0	0	0	
Res_CHI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Res_CHI	0	0	0	
Total	50.574	50.378	56.811	58.835	55.246	48.759	46.629	46.344	44.911	40.914	41.601	42.961	45.514	-5.060	Total	49,974	50.343	56.424	

5. Reservoir discharges, disaggregated by individual reservoir.

Baseline	discharges, n	nm3/month													Scenario	discharges, n	nm3/month			
OutDis			Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep				Oct	Nov	Dec
KYR	Big		0	0	0	0	0	0	0	0	0	0	0	0	KYR	Big		0	0	0
KYR	Big	Res_TOK	834	1.295	1.075	1.268	1.461	1.690	1.637	1.227	1.346	892	745	731	KYR	Big	Res_TOK	683	1.856	2.047
TAD	Big	Res_AND	314	314	314	314	314	314	314	314	314	314	314	314	TAD	Big	Res_AND	314	314	314
TAD	Big	Res_KAR	1.866	1.866	1.866	1.866	1.866	1.866	1.866	1.866	1.866	1.411	1.866	1.866	TAD	Big	Res_KAR	1.866	1.866	1.866
UZB	Big	Res_CHA	455	628	462	456	894	573	589	524	1.338	1.338	848	458	UZB	Big	Res_CHA	455	628	462
KAZ	Big	Res_SHA	1.350	1.350	1.350	1.350	1.350	1.350	1.350	1.350	1.350	1.350	1.350	1.350	KAZ	Big	Res_SHA	1.350	1.350	1.350
TAD	Big		0	0	0	0	0	0	0	0	0	0	0	0	TAD	Big		0	0	0
TAD	Big	Res_NUR	3.023	2.881	1.733	1.283	1.180	1.400	1.457	1.500	1.136	1.537	2.087	2.215	TAD	Big	Res_NUR	1.491	3.234	1.762
UZB	Big	Res_TMP	1.449	3.299	3.299	3.299	3.299	3.299	1.219	2.088	2.990	2.776	2.206	2.501	UZB	Big	Res_TMP	1.735	3.299	3.299
UZB	Big		0	0	0	0	0	0	0	0	0	0	0	0	UZB	Big		0	0	0
TAD	Big		0	0	0	0	0	0	0	0	0	0	0	0	TAD	Big		0	0	0
TAD	Big		0	0	0	0	0	0	0	0	0	0	0	0	TAD	Big		0	0	0
FER	Middle	Res_FER	279	1.004	184	173	538	0	298	1.396	1.385	1.602	1.379	612	FER	Middle	Res_FER	279	1.126	439
UZB	Middle	Res_AHA	0	0	0	0	0	0	0	548	178	0	142	0	UZB	Middle	Res_AHA	0	0	0
UZB	Middle	Res_ARN	0	0	0	0	0	0	0	0	357	964	654	0	UZB	Middle	Res_ARN	0	0	0
KAZ	Middle	Res_KOK	0	0	0	0	0	0	0	0	0	0	0	0	KAZ	Middle	Res_KOK	0	0	0
KAZ	Middle	Res_ARY	65	19	29	0	282	254	20	368	0	68	19	0	KAZ	Middle	Res_ARY	65	19	29
TAD	Middle	Res_KAF	627	138	295	759	101	415	589	1.752	1.409	945	101	295	TAD	Middle	Res_KAF	664	101	295
TUR	Middle	Res_ZD	190	907	139	29	1.177	0	1.397	2.753	4.697	2.095	2.520	268	TUR	Middle	Res_ZD	196	799	139
TUR	Middle	Res_TUR	0	0	0	1.386	622	141	0	242	512	0	0	0	TUR	Middle	Res_TUR	0	0	0
UZB	Middle	Res_SUR	0	0	0	363	119	615	293	851	148	0	0	0	UZB	Middle	Res_SUR	65	18	21
UZB	Middle	Res_KAS	0	0	0	0	377	0	255	0	0	0	0	0	UZB	Middle	Res_KAS	0	0	0
UZB	Middle	Res_TAL	132	691	28	425	0	0	344	884	1.164	791	787	249	UZB	Middle	Res_TAL	122	540	28
UZB	Middle	Res_BUK	562	0	0	464	1.080	0	599	961	1.375	481	651	350	UZB	Middle	Res_BUK	451	0	0
KYR	Cascade		0	0	0	0	0	0	0	0	0	0	0	0	KYR	Cascade		0	0	0
UZB	Cascade		0	0	0	0	0	0	0	0	0	0	0	0	UZB	Cascade		0	0	0
TAD	Cascade		0	0	0	0	0	0	0	0	0	0	0	0	TAD	Cascade		0	0	0
UZB	Cascade	Res_CHI	0	0	0	0	0	0	0	0	0	0	0	0	UZB	Cascade	Res_CHI	0	0	0
Total			10.584	14.392	#NAME?	12.971	13.580	11.917	11.628	17.663	20.190	16.083	15.018	10.859	Total	Total	Total	9.285	15.150	12.051



6. Reservoir spills, disaggregated by individual reservoir.

Baseline reservoir ov													Scenario reservoir overflov			
OutFlw	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		Oct	Nov	
Res_KAM	0	0	0	0	0	0	0	0	0	0	0	0	Res_KAM	0	0	
Res_TOK	0	0	0	0	0	0	0	0	0	0	0	0	Res_TOK	0	0	
Res_AND	0	0	0	0	0	0	0	0	0	-81	0	0	Res_AND	0	0	
Res_KAR	0	0	0	0	0	-213	0	0	0	0	0	0	Res_KAR	0	0	-1
Res_CHA	0	0	0	0	0	0	0	0	0	0	0	0	Res_CHA	0	0	
Res_SHA	-343	0	0	0	0	0	0	0	0	0	0	0	Res_SHA	0	0	
Res_ROG	0	0	0	0	0	0	0	0	0	0	0	0	Res_ROG	0	0	
Res_NUR	0	0	0	0	0	0	0	0	0	0	0	0	Res_NUR	0	0	
Res_TMP	0	0	0	0	0	0	0	0	0	0	0	0	Res_TMP	0	0	
Res_TMR	0	0	0	0	0	0	0	0	0	0	0	0	Res_TMR	0	0	
Res_DAS	0	0	0	0	0	0	0	0	0	0	0	0	Res_DAS	0	0	
Res_ZAR	0	0	0	0	0	0	0	0	0	0	0	0	Res_ZAR	0	0	
Res_FER	0	0	0	0	0	0	0	0	0	0	0	0	Res_FER	0	0	
Res_AHA	0	0	0	0	0	0	0	0	0	0	0	0	Res_AHA	0	0	
Res_ARN	0	0	0	0	0	0	0	0	0	0	0	0	Res_ARN	0	0	
Res_KOK	0	0	0	0	0	0	0	0	0	0	0	0	Res_KOK	0	0	
	0	0	0	0	0	0	0	0	0	0	0	0		0	0	
Res_KAF	0	0	0	0	0	0	0	0	0	0	0	0	Res_KAF	0	0	
Res_ZD	0	0	0	0	0	0	0	0	0	0	0	0	Res_ZD	0	0	
Res_TUR	0	0	0	0	0	0	0	0	0	0	0	0	Res_TUR	0	0	
Res_SUR	0	0	0	0	0	0	0	0	0	0	0	0	Res_SUR	0	0	
Res_KAS	0	0	0	0	0	0	0	0	0	0	0	0	Res_KAS	0	0	
Res_TAL	0	0	0	0	0	0	0	0	0	0	0	0	Res_TAL	0	0	
Res_BUK	0	0	0	0	0	0	0	0	0	0	0	0	Res_BUK	0	0	
Res_NAR	0	0	0	0	0	0	0	0	0	0	0	0	Res_NAR	0	0	
Res_FAR	0	0	0	0	0	0	0	0	0	0	0	0	Res_FAR	0	0	
Res_VAH	0	0	0	0	0	0	0	0	0	0	0	0	Res_VAH	0	0	
Res_CHI	0	0	0	0	0	0	0	0	0	0	0	0	Res_CHI	0	0	
Total	-343	0	0	0	0	-213	0	0	0	-81	0	0	Total	0	0	

Charts are also available for all tables presented in this section.

How to view other information about the water balance of the basin

Other information about the water balance of the basin is available on the worksheets "waterBalance" and "balanceZoneDetail". Much of this information is used to check water balances within the GAMS model and for other quality assurance purposes. However, some of the information on these worksheets may be useful for interpreting scenario impacts. This information is summarized here.

1. Inflows to terminal lakes in the basin are presented in the tables called "Lake inflows" on the "waterBalance" worksheet. This information is useful for interpreting the impact of a particular scenario on inflows to the Aral Sea and other terminal lakes.

	Lake inflows (baselin	ne), mm3/montl	h											Lake inflows (Scenari	o), mm3/	/month	
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		Oct	Nov	Dec
	Aral Sea North	1.521	1.207	1.307	1.003	1.191	1.527	1.165	982	705	674	669	919	Aral Sea North	1.202	1.235	1.307
(1)	Aral Sea South	1.101	2.501	2.970	1.876	1.585	2.849	409	300	300	300	300	1.328	Aral Sea South	1.406	2.555	2.970
	Golden Lake	2	32	0	42	52	0	93	175	228	274	126	59	Golden Lake	2	32	0
	Lake Ayd	55	55	55	55	55	55	5	5	5	5	5	5	Lake Ayd	55	55	222
	Syr Darya Lakes	47	113	39	109	134	73	222	326	466	417	376	184	Syr Darya Lakes	47	113	39
	Amu Darya Lakes	89	841	231	227	288	75	268	589	1.003	511	591	160	Amu Darya Lakes	89	841	231
	All lakes	2.815	4.749	4.602	3.312	3.305	4.579	2.162	2.377	2.707	2.181	2.067	2.655	All lakes	2.801	4.831	4.769
	Note: This table incl	udes return flow	v to lakes	which i	s not in	cluded i	n the "- to	lakes" ro	ows in th	e tables	ahove			Note: This table inclu	ides retui	n flow t	o lakes

Reporting

A number of charts have been developed in an effort to standardize the reporting of scenario results and facilitate the interpretation of scenario impacts. To be consistent with the goals of the project, it should be possible to interpret the results of each scenario in terms of impacts on effectiveness, efficiency, and equity. Each chart has been developed with the intention to provide information on the impacts of a scenario on one of these three considerations.

Which charts can be used to report on effectiveness impacts?

Effectiveness is defined as a measure of the extent to which water allocation institutions maximize welfare. Welfare is defined here at the basin scale. Therefore, a change to water allocation is considered to increase effectiveness if the change increases overall welfare at the basin scale. The following charts can be used to report on effectiveness impacts:

1. The chart titled "Annual basin income" on the "economy" worksheet compares overall basin value added for the baseline and the current scenario. Overall basin income is disaggregated into hydropower and irrigation (all other water uses are represented as constraints in the model and therefore do not appear in the basin income calculation). The comparison of overall income presented on the left of the chart is the best single measure of effectiveness impacts at the basin scale.



2. Although disaggregated at country level, the charts comparing value added per unit land use and per unit water use on the "agriculture" worksheet give some insight into how the effectiveness of water use changes from the baseline to the scenario.





3. Because reservoir operations are driven by economic optimization criteria in all scenarios, scenario results can provide insight into how to operate reservoirs in order to maximize effectiveness. The chart titled "Reservoir volume" on the "reservoirs" worksheet compares baseline and scenario reservoir storages for the Toktogul and Naryn reservoirs. This chart provides insight into how these reservoirs could be operated differently in order to maximize basin-wide economic welfare.



Which charts can be used to report on efficiency impacts?

Efficiency is defined as a measure of water use per unit activity level. For example, the efficiency of water use in the production of irrigated cotton can be measured in terms of the annual amount of water used per hectare in production, or the amount of water used per tonne of output. Measures that increase efficiency, such as water-saving irrigation technologies, can release water for other uses and thereby enhance effectiveness. The following chart can be used to report on efficiency impacts:



1. The charts labelled "Water intensity" compare per hectare water use in the baseline and scenario.

Which charts can be used to report on equity impacts?

Equity is defined as a measure the extent to which measures to improve efficiency and effectiveness affect the welfare of different groups in the region. Measures that increase overall welfare at the basin scale may have positive welfare impacts on some groups in the basin and negative impacts on other groups. Measures to increase efficiency may also have a range of impacts on different groups. The following charts can be used to report on equity impacts:

1. The chart titled "Annual national value added from HEPS" on the "economy" worksheet provides information about how welfare changes resulting from changes to hydropower production are distributed among the riparian countries. This chart is also available in GDP units.



2. The chart titled "Annual national income from agriculture" on the "economy" worksheet provides information about how changes to income from agricultural production are distributed among the riparian countries. This chart is also available in GDP units.



3. The charts titled "Agricultural production" on the "agriculture" and the "agricultureByZone" worksheets provide information about changes in the production of crops in each country and planning zone.



4. The charts titled "Labor use" on the "agriculture" and the "agricultureByZone" worksheets provide information about changes in farm employment in each country and planning zone.

