

«М.Х.Дулати атындағы Тараз өңірлік университеті» КЕ АҚ «Су шаруашылығы» бағыты бойынша республикалық оқу-әдістемелік кеңестің оқу-әдістемелік бірлестігі мәжілісінің



Канада және АҚШ жоғары оқу орындары, ғылыми-зерттеу орталықтарымен ынтымақтастықты жүргізу, бірлескен қос базалық оқыту бағдарламаларын жасау бойынша Тараз университеті атынан өкіл тағайындау

Сағынтаев Жанай Матайұлы

Мичиган Университеті, геоғылымдар департаменті және

М.Х. Дулати атындағы Тараз өңірлік университеті профессоры

WhatsApp +1-269-359-5211, jay.sagin@wmich.edu

ПРОБЛЕМА СЛАБОЙ ПРАКТИЧНОСТИ ОБРАЗОВАНИЯ, СВЯЗИ КОЛЛЕДЖЕЙ С УНИВЕРСИТЕТАМИ

Динамика трудоустройства после окончания колледжа в РК, %

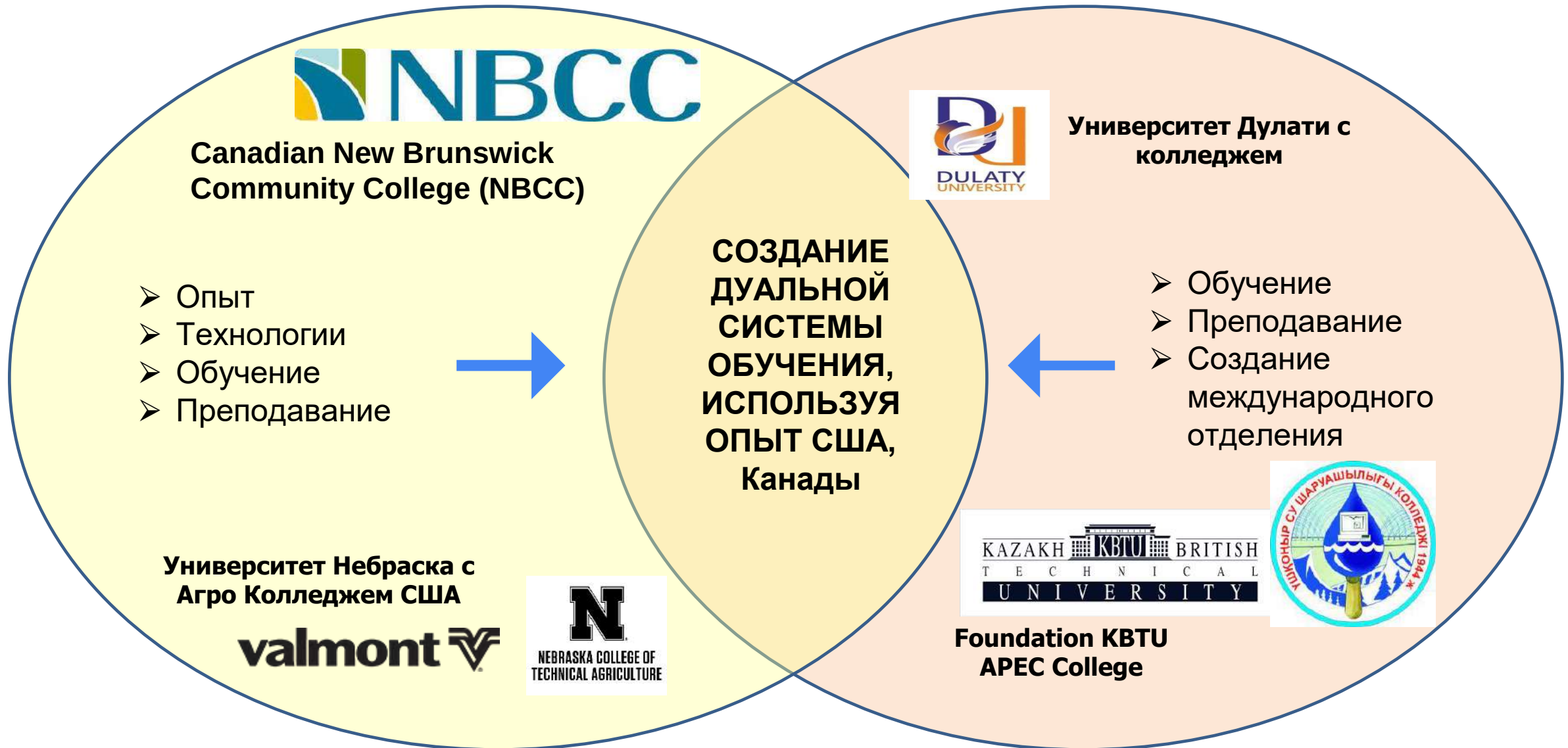


Из 144 тыс. выпускников колледжей 2020 года 56 тыс. не смогли трудоустроиться
(из них только 14-15 тыс. человек (около 10%) продолжают обучение в ВУЗах)

Причины

- 1. Слабая техническая оснащенность колледжей и университетов.** Только 50% колледжей страны имеют современное оборудование для обучения и профессиональной практики.
- 1. Дисбаланс между учебными программами и требованиями работодателей.**
- 1. Сложности продвижения дуальной системы образования в организациях ТиПО.** Предприятия плохо интегрированы в кооперацию с колледжами и университетами. На сегодня в дуальных программах задействовано всего 19% учащихся.

УСИЛЕНИЕ ПРАКТИЧНОСТИ ОБРАЗОВАНИЯ, СВЯЗИ КОЛЛЕДЖЕЙ С УНИВЕРСИТЕТАМИ С МЕЖДУНАРОДНЫМИ ЦЕНТРАМИ



Foundation с колледжами-университетами США и Канады

Nebraska Agro Technical College, Valmont Irrigation
<http://www.irrigation.education/>
Know your well
High School training program
<https://knowyourwell.unl.edu/>

English Language
New Brunswick McKenzie College,
https://mckenzie.edu/our_programs/english-for-academic-purposes-eap/

Environmental Technology
Canadian New Brunswick
Community College (NBCC)
<https://nbcc.ca/programs-courses/program-details?baseCurriculumId=eebb111b-3d90-4936-b61f-bb119f5f181c>

колледж Северной Атлантики,
Специалист по QGIS Python
моделирование водных ресурсов
<https://www.cna.nl.ca/program/geographic-information-systems-applications-specialist>

Akhmetsafin Hydro
geology Institute

APEK College

Taraz Regional
University

Ushkonur College of Water Resources

KBTU



Центр Академического Превосходства по Водным Ресурсам Таразский Региональный Университет - Международные научные проекты и публикации

Nebraska College University,
Know your well
High School training program
<https://knowyourwell.unl.edu/>

Environmental Technology
Canadian New Brunswick
Community College (NBCC)
<https://nbcc.ca/programs-courses/program-details?baseCurriculumId=eebb111b-3d90-4936-b61f-bb119f5f181c>

German Dresden Technical University
"Urban water management - German
expertise for Kazakh cities"
(TERESA) MAR <https://teresa.inowas.com/>

German-Kazakh University
The Silk Road of Knowledge: Science Meets
Green Policy
Central Asian Water Research Journal,
<https://water-ca.org/>

EU, Switzerland,
Blue Peace Central Asia
<https://bluepeace-centralasia.ch>
eLTER Research Infrastructure, <https://elter-ri.eu/transnational-remote-access-ta-ra>, Horizon subproject

Central Asian Mountain Observatory Network (CAMON),
led by Prof. Maria Shahgedanova, University of Reading,
UK (Dr. Duisebek advisor)
<https://www.geomountains.org/news/events/details/2023-04-18/331-mri-mountains-observatories-working-group-and-geo-mountains-workshop-in-central-asia>,
<https://form.jotform.com/230181795145356>

Akhmetsafin Hydro geology Institute

APEK College

Ushkonur College of Water Resources

**Taraz Regional
University**

KBTU



TVET обучение и сертификация

Создание онлайн
курсов

Практика

Бизнес план
Проектное
финансирование

1

Преподаватели проходят обучение по созданию онлайн курсов

(<http://cakn.online/en/online-academy>(<http://cakn.online/en/online-academy>, <https://www.edx.org/school/wbgx>(<http://cakn.online/en/online-academy>, <https://www.edx.org/school/wbgx>, <http://workshopkzusa.tilda.ws/>)

2

Прошедшие обучение создают совместные курсы с преподавателями США, Канады, Германии

3

Практические занятия на предприятиях Казахстана, США, Канады, Германии

4

Международная профессионально техническая сертификация

5

Обучение бизнес планированию с проектным финансированием, программа для результатов (PforR)

TVET (Technical and Vocational Education and Training)

ПОВЫШЕНИЕ КВАЛИФИКАЦИИ ПРЕПОДАВАТЕЛЕЙ



Всемирный Банк продвигает создание модулей онлайн-обучения на платформе EdX от Гарвардского Университета и Университета Массачусетс , США

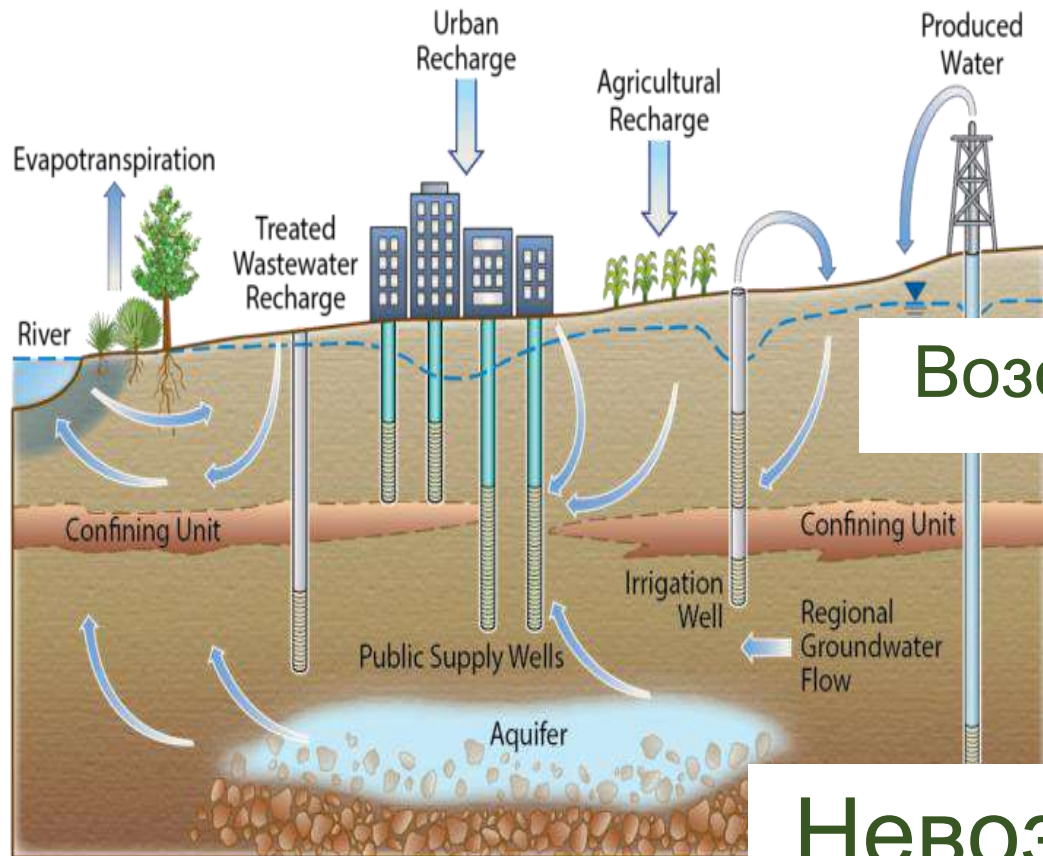
Open edX - один из крупнейших ресурсов для массовых онлайн-курсов

<http://cakn.online/en/>

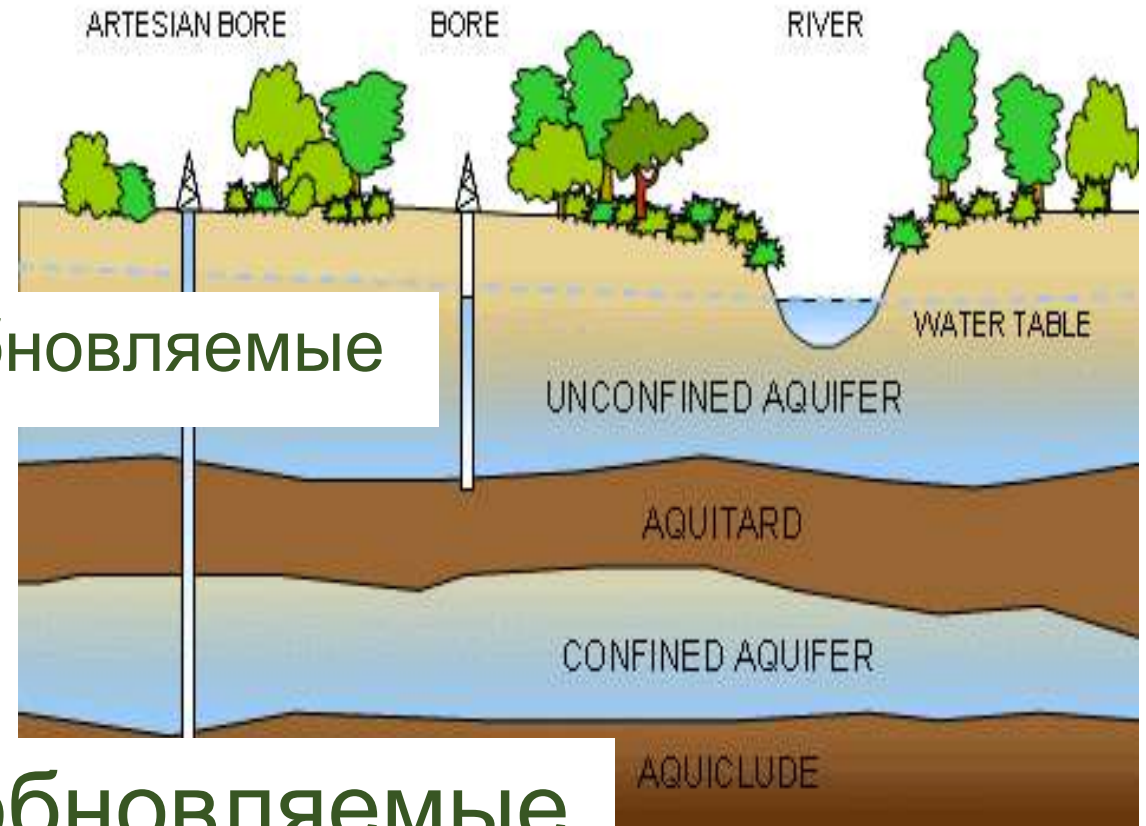
<http://cakn.online/en/online-academy>

<https://www.worldbank.org/en/region/eca/brief/cawep>

Возобновляемые - Невозобновляемые Водные Ресурсы



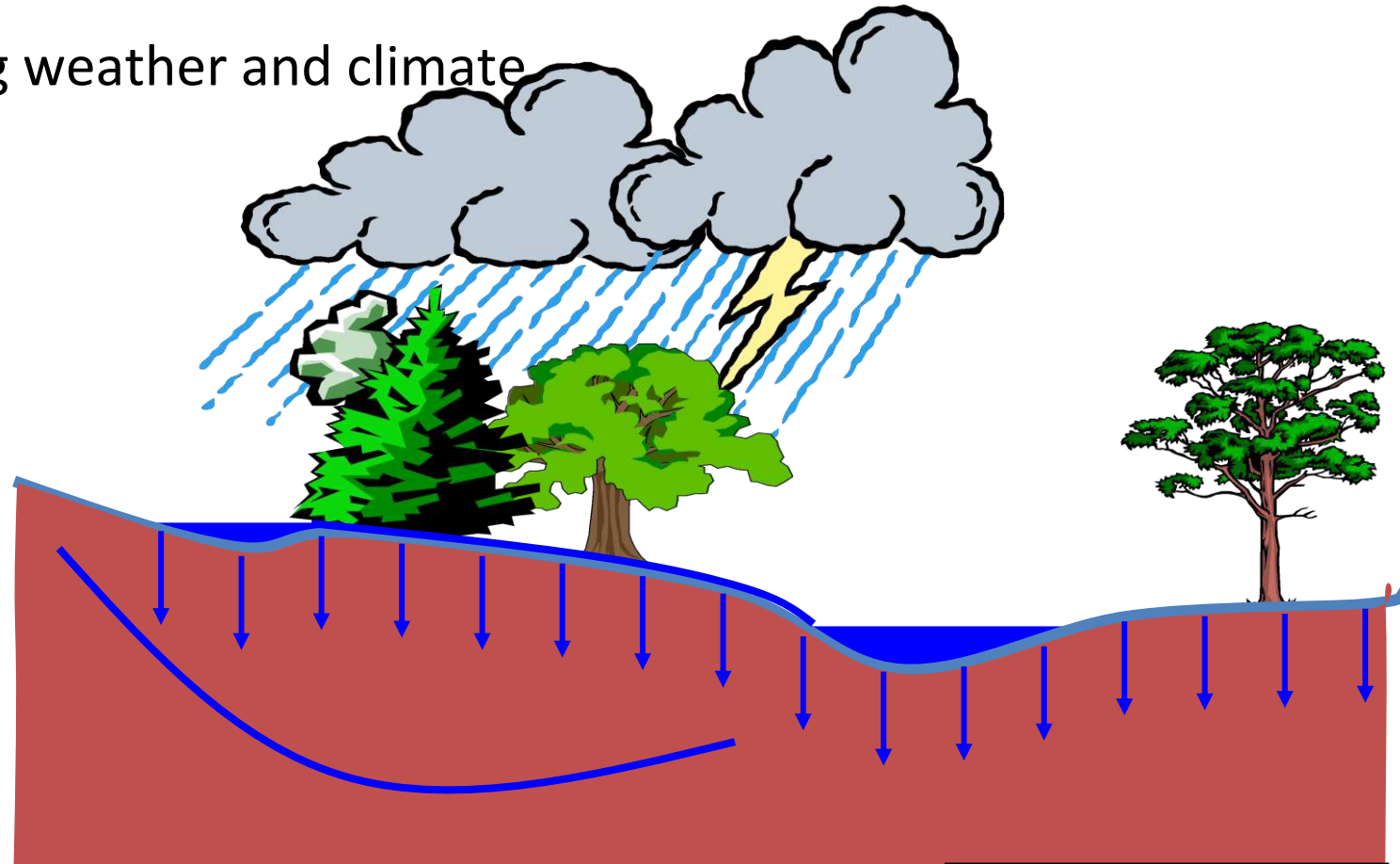
Возобновляемые



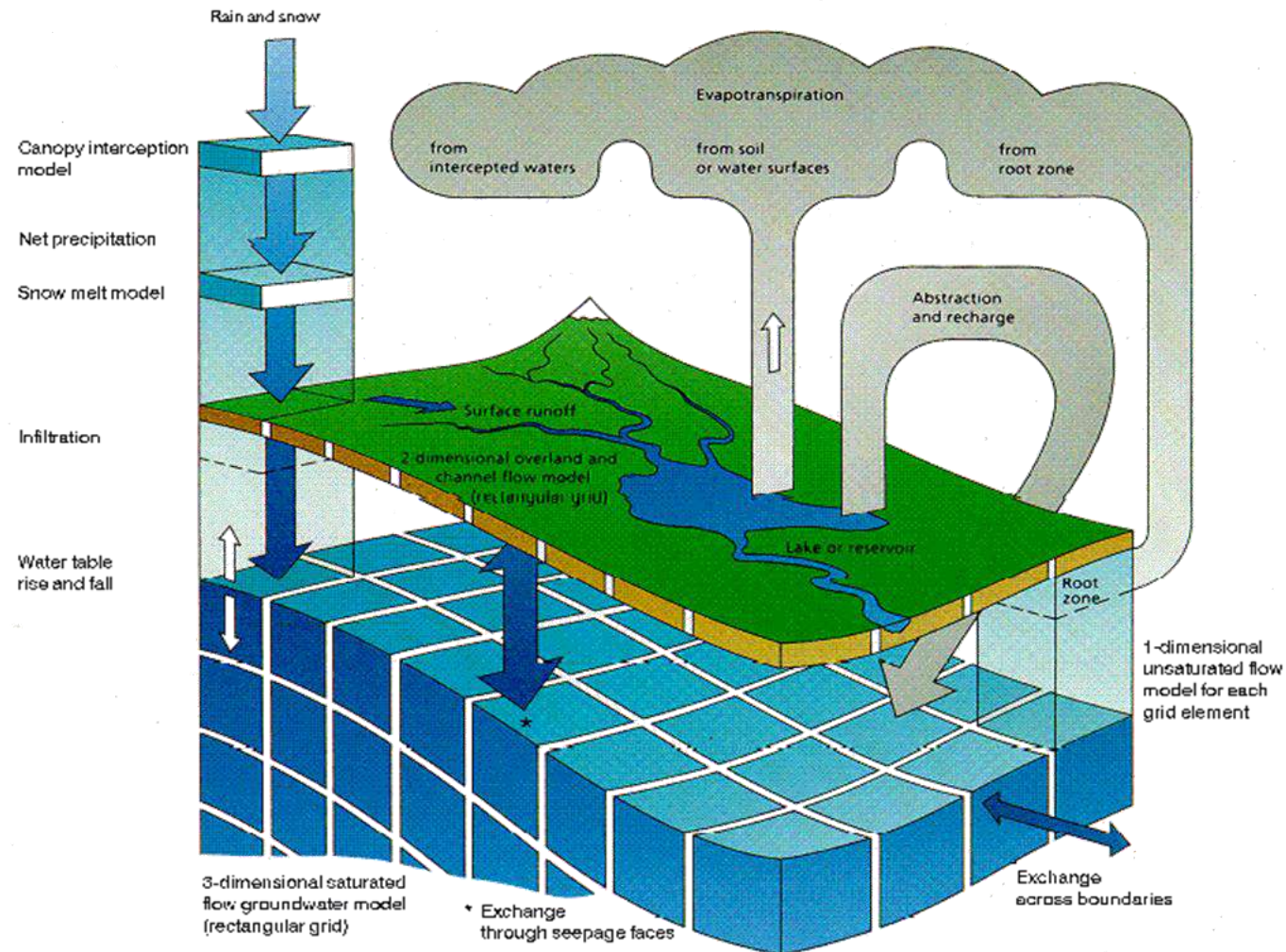
Невозобновляемые

Hydrology - Hydrogeology

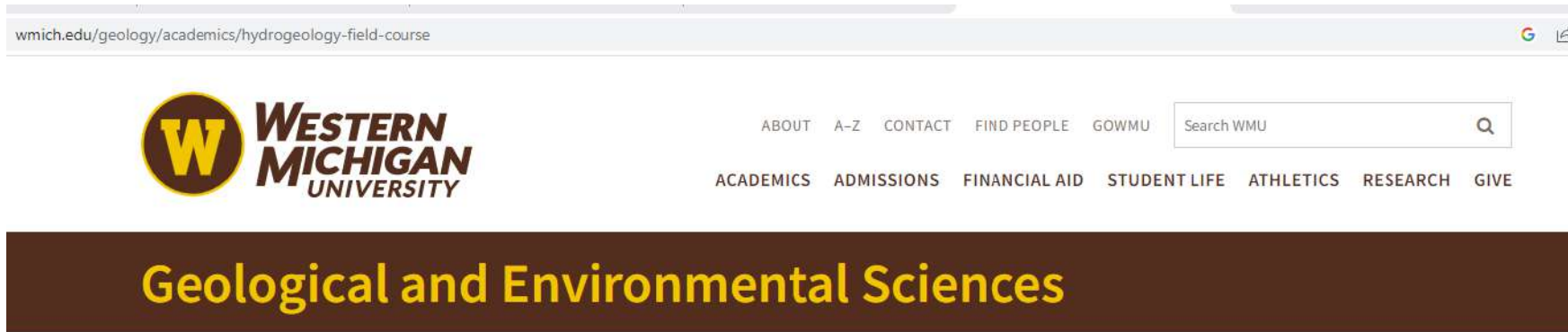
- **Meteorology**
 - Study of the atmosphere including weather and climate
- **Surface water hydrology**
 - Flow and occurrence of water on the surface of the earth
- **Hydrogeology**
 - Flow and occurrence of ground water



- Meteorology
- Surface water hydrology
- Hydrogeology



<https://wmich.edu/geology/academics/hydrogeology-field-course>



COURSE DATES - SUMMER 2023

Hydrogeology Field Course

Summer II Semester

- GEOS 5250 - Surface Geophysics: July 10-15
- GEOS 5230 - Hazardous Waste Operations and Emergency Response (HAZWOPER): July 17-22
- GEOS 5270 - Principles and Practices of Well Drilling and Installation: July 24-29
- GEOS 5280 - Principles and Practices of Groundwater Sampling and Monitoring: July 31-Aug. 5
- GEOS 5260 - Principles and Practices of Aquifer Testing: Aug. 7-12
- GEOS 5240 - Remediation Design and Implementation: Aug. 14-19

APPLICATION INSTRUCTIONS - SUMMER 2023

Registration for the HFC will begin on Jan. 1, 2023 and remain open until full. Those persons wishing to apply earlier than Jan. 1, 2023 may do so, but applications will not begin to be reviewed and processed until that date. The courses usually fill up quickly so the earlier you complete your registration the better chance you will have of securing a spot in the course. Enrollment is limited to qualified applicants with preference to those whom apply first and/or apply for multiple weeks. Places will be filled in the order in which registration fees and completed applications are received.

German Dresden Technical University - Nazarbayev University campus,

R&D Engineering <https://niokr.kz/>

“Urban water management - German expertise for Kazakh cities”

(TERESA) <https://teresa.inowas.com/> , SusDrain (<https://www.susdrain.org/>) , Managed Aquifer Recharge (MAR) <https://inowas.com> , <http://marpro.inowas.com/> , <https://smart-control.inowas.com/training-material/> , <https://teresa.inowas.com/partners-2/>)

Таразский Региональный Университет - Водные Ресурсы

Akhmetsafin Hydro-geology Institute

KB TU

Факультет геологии и геологоразведки- Геофизические методы поисков и разведки месторождений полезных ископаемых

Школа Энергетики и нефтегазовой индустрии - Бурение скважин

Ushkonur College of Water Resources - насосы WILO

Water related issues:

Flood



Drought - Desertification



Human influence on floods

- Rapid runoff into channelized streams increase flood frequency and enhance downstream peaks in flood hydrographs.



www.aquatic.uoguelph.ca/rivers/chphys.htm



OUTCOMES AND DAMAGES

Sediment transport



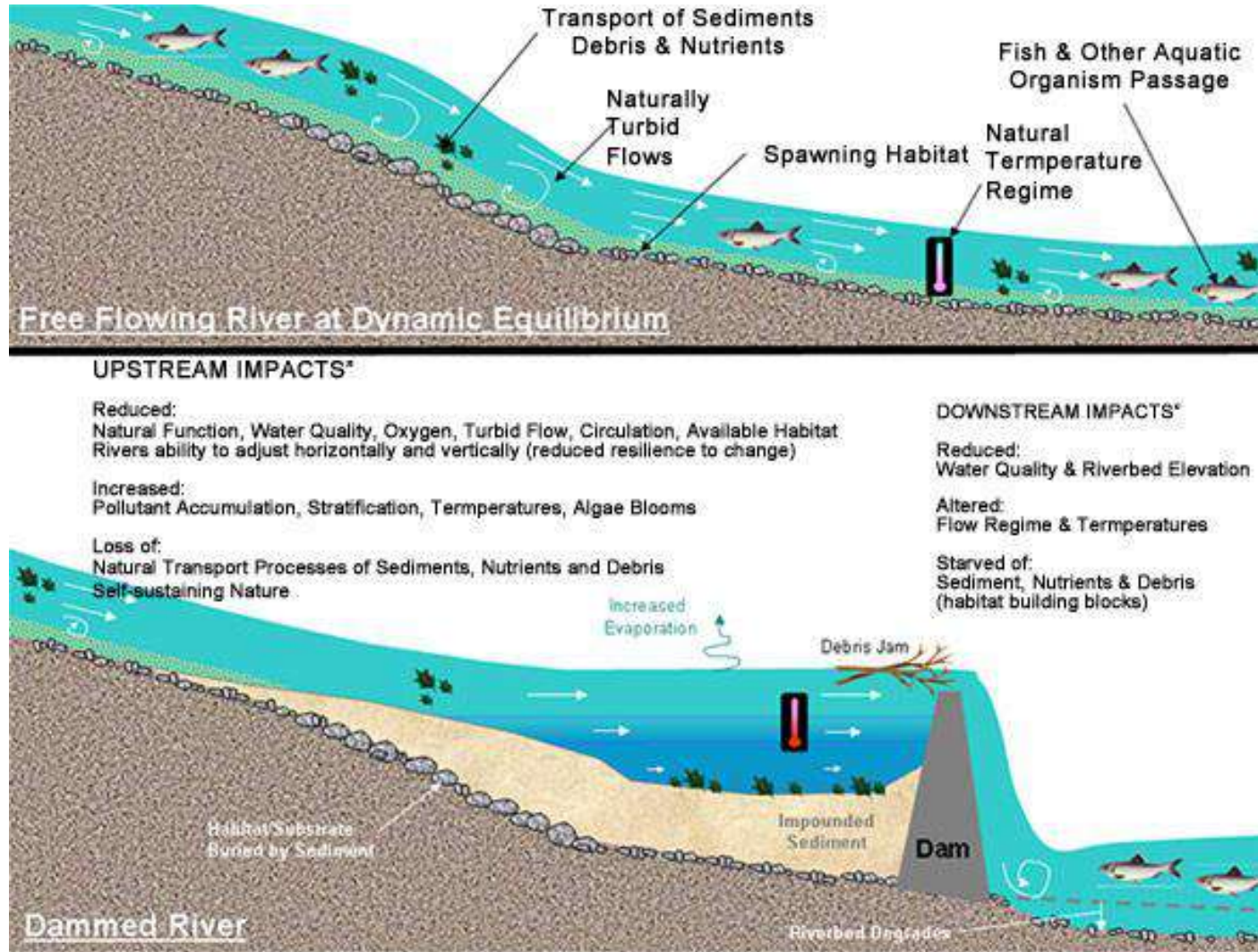
Sediments for
agriculture



Sediments for
flora and fauna

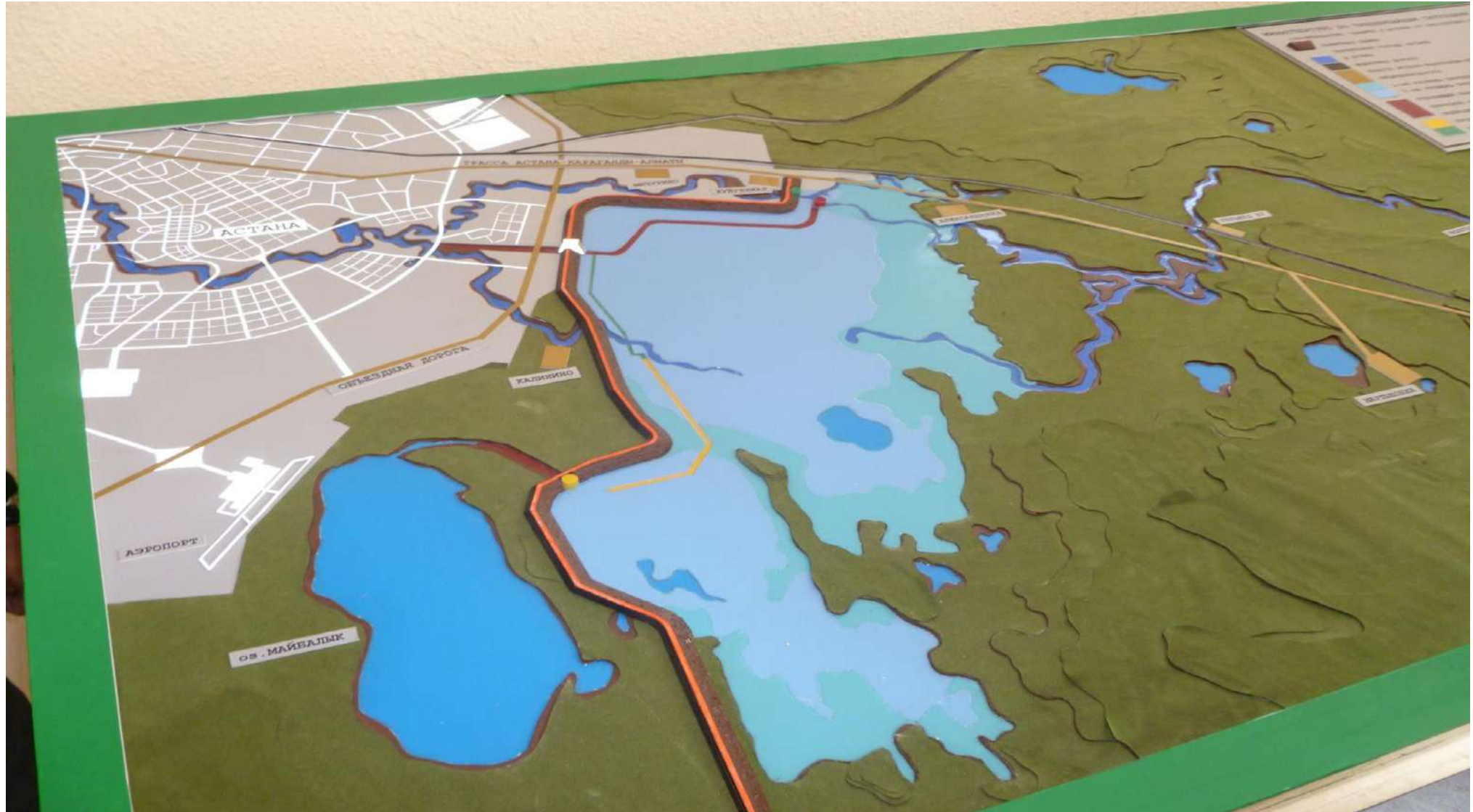


Sediments for fish



Reservoir- dam

Upstream of Astana city



Germany



Kazakhstan





<https://euracoal.eu/info/country-profiles>



<http://aboutkazakhstan.com>

Old mining facilities

Dresden – Leipzig area



Snow collection, flash flood water reuse

Tempelhof Airport - Berlin



Snow collection, flash flood water reuse

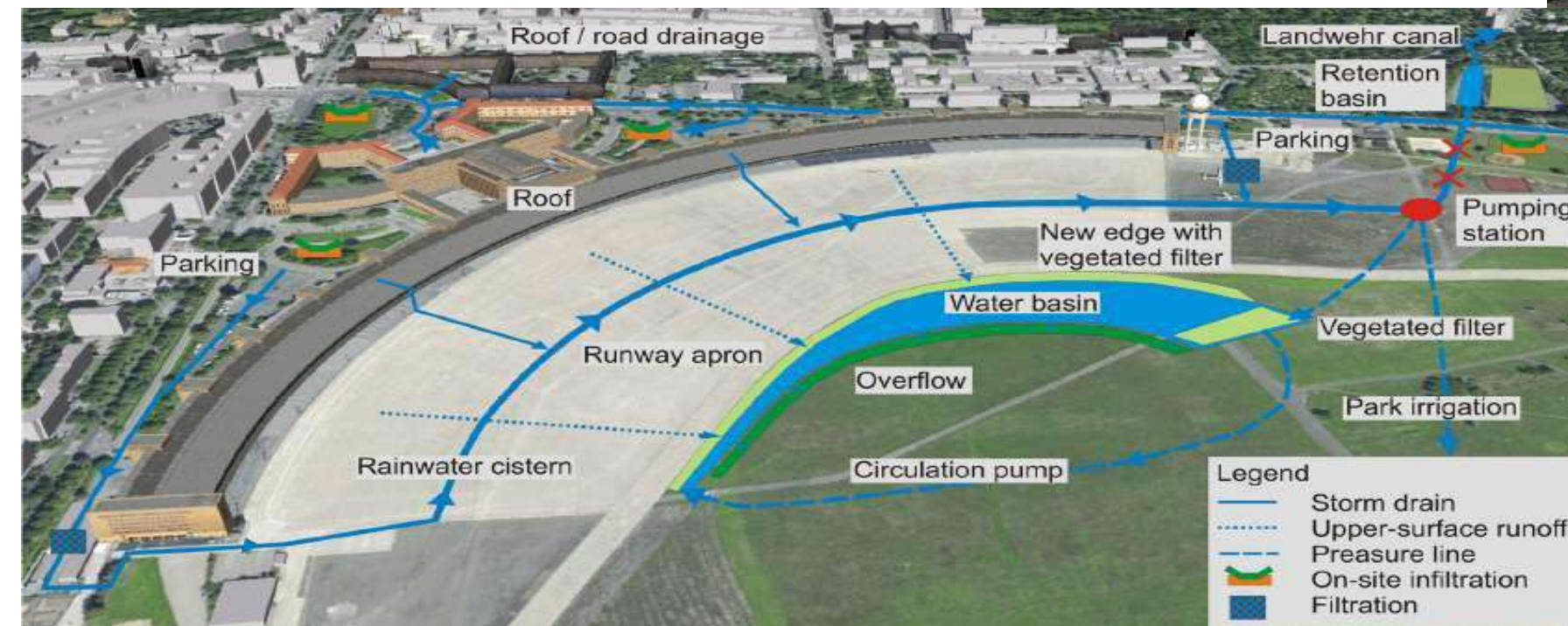
Tempelhof Airport - Berlin



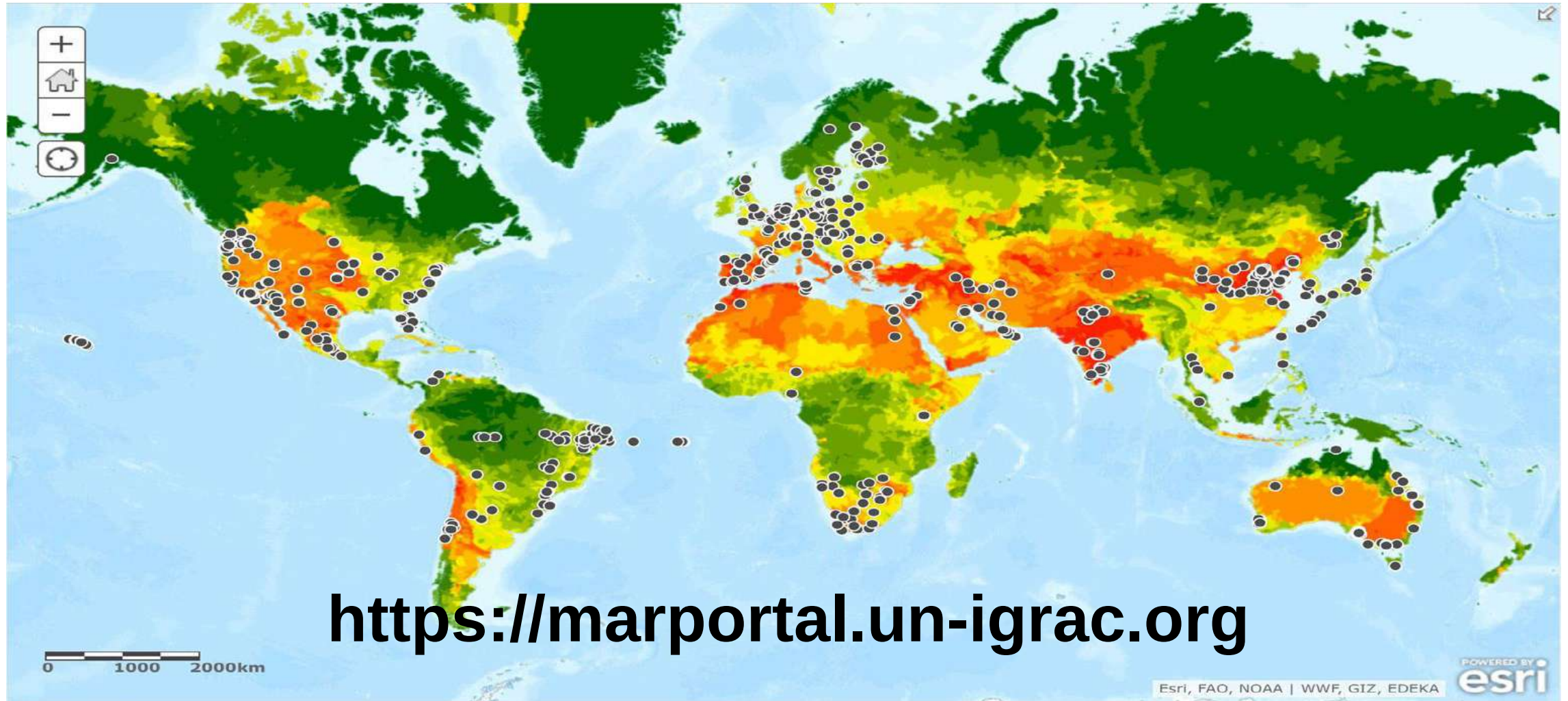
Courtesy of Dr. Heiko Sieker

Snow collection, flash flood water reuse

Canada



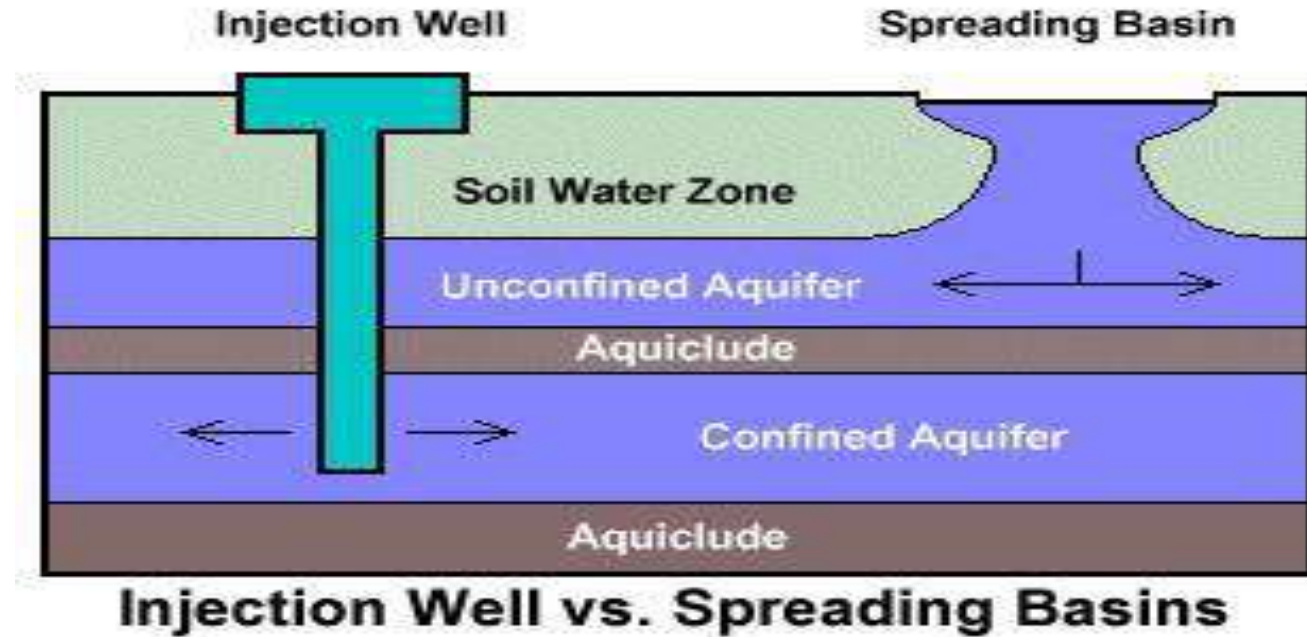
MAR for global change mitigation



Global MAR Portal

What is ASR?

Artificial Storage and Recharge/Recovery



ASR is a water resource management tool, using below ground storage of water with the intent to recover water at a later date.

MAR processes

- Unconfined aquifers

A. Water collection

B. Pre-treatment

C. Evaporation

D. Clogging

E. Transport unsaturated zone

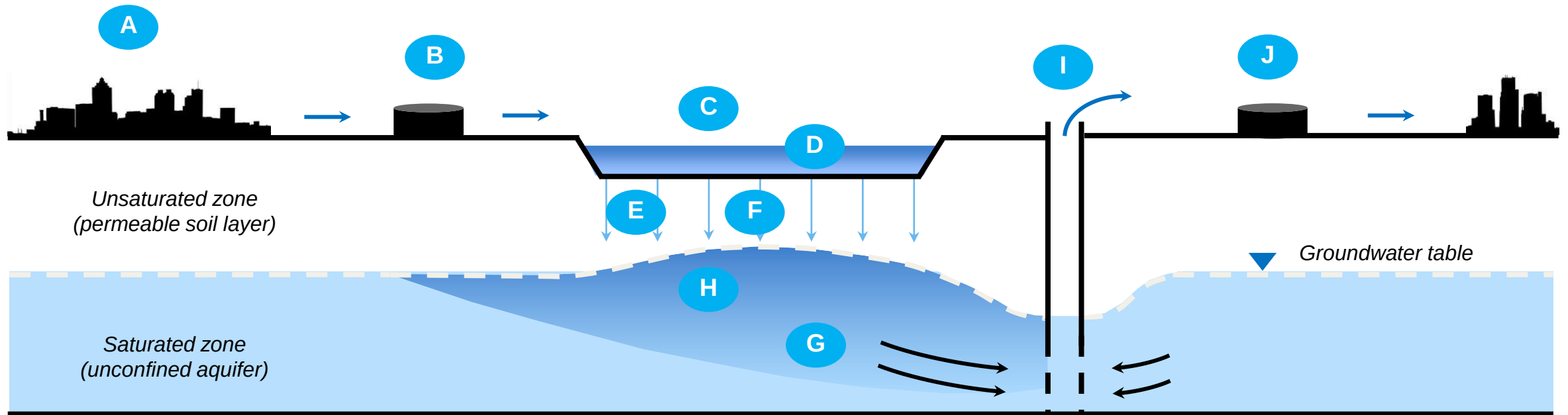
F. Transformation unsaturated zone

G. Transport saturated zone

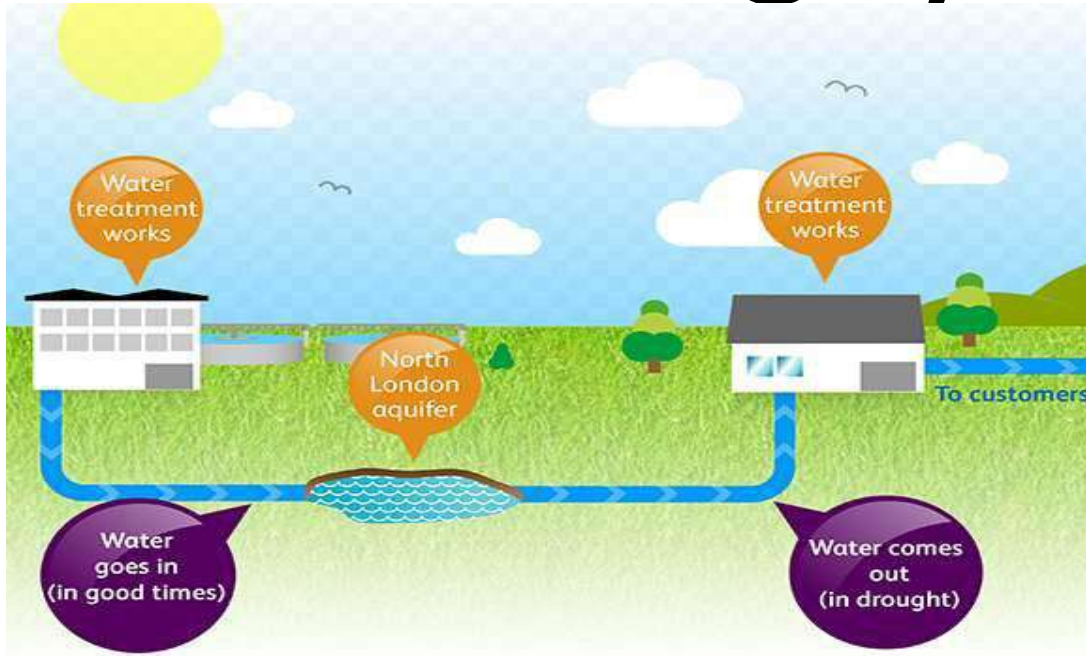
H. Transformation saturated zone

I. Recovery

J. Post-treatment



Example: Enfield – Haringey London



Salisbury, AUSTRALIA

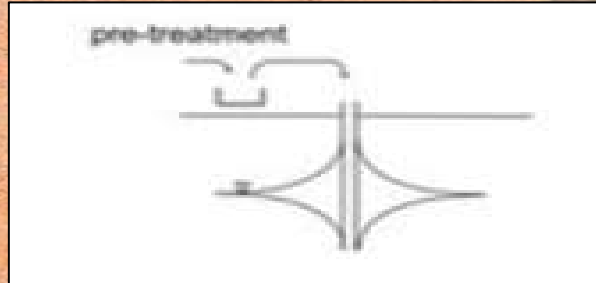
Since: 2008

MAR type: Aquifer storage and recovery

Influent: Rain water

Final use: Agriculture (irrigation)

Purpose: Maximize natural storage



Source: Stefan, 2012

Shafdan, ISRAEL

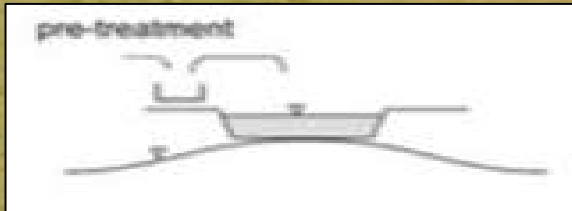
Since: 1977

MAR type: Infiltration basins

Influent: Reclaimed wastewater

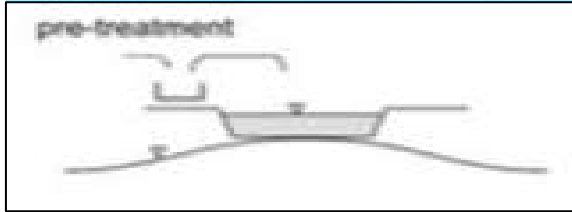
Final use: Agriculture (irrigation)

Purpose: Water quality management



Source: Stefan, 2012

Atlantis, SOUTH AFRICA



Since: 1979

MAR type: Infiltration basins

Influent: Reclaimed wastewater

Final use: Domestic (water supply)

Purpose: Maximize natural storage



Source: Murray, 2009

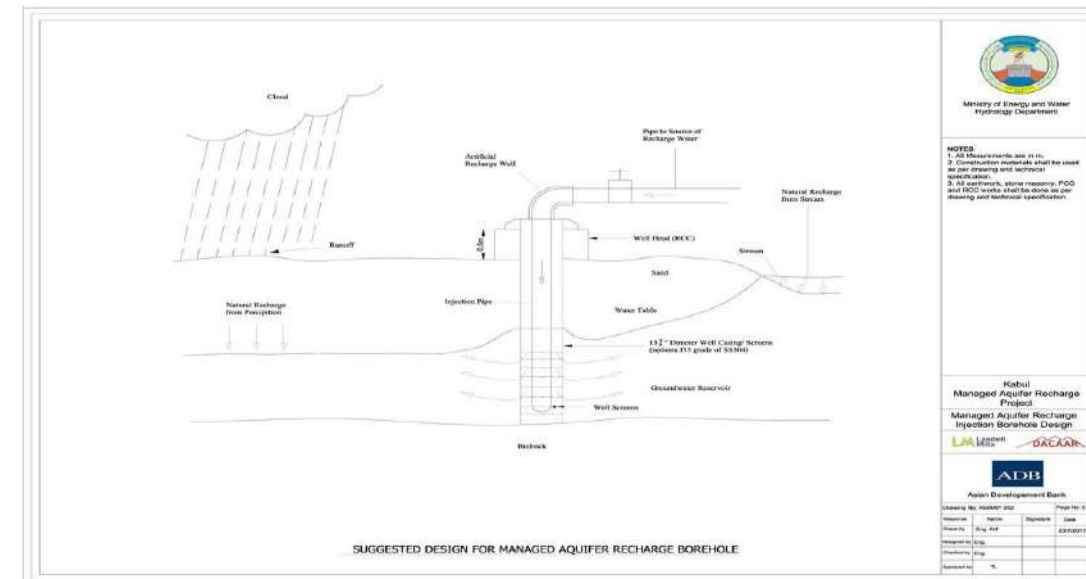
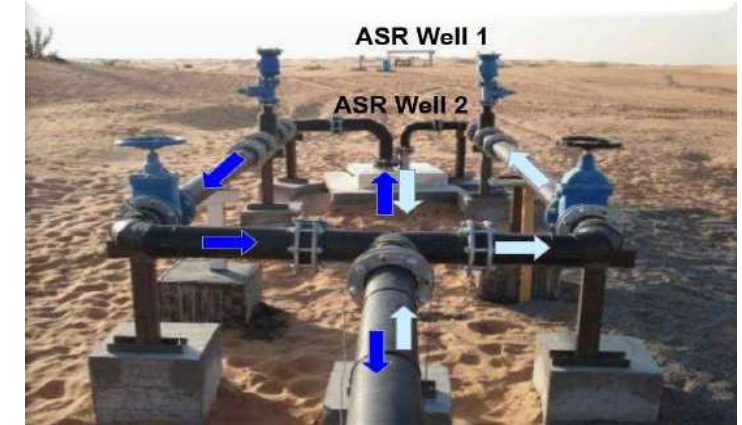
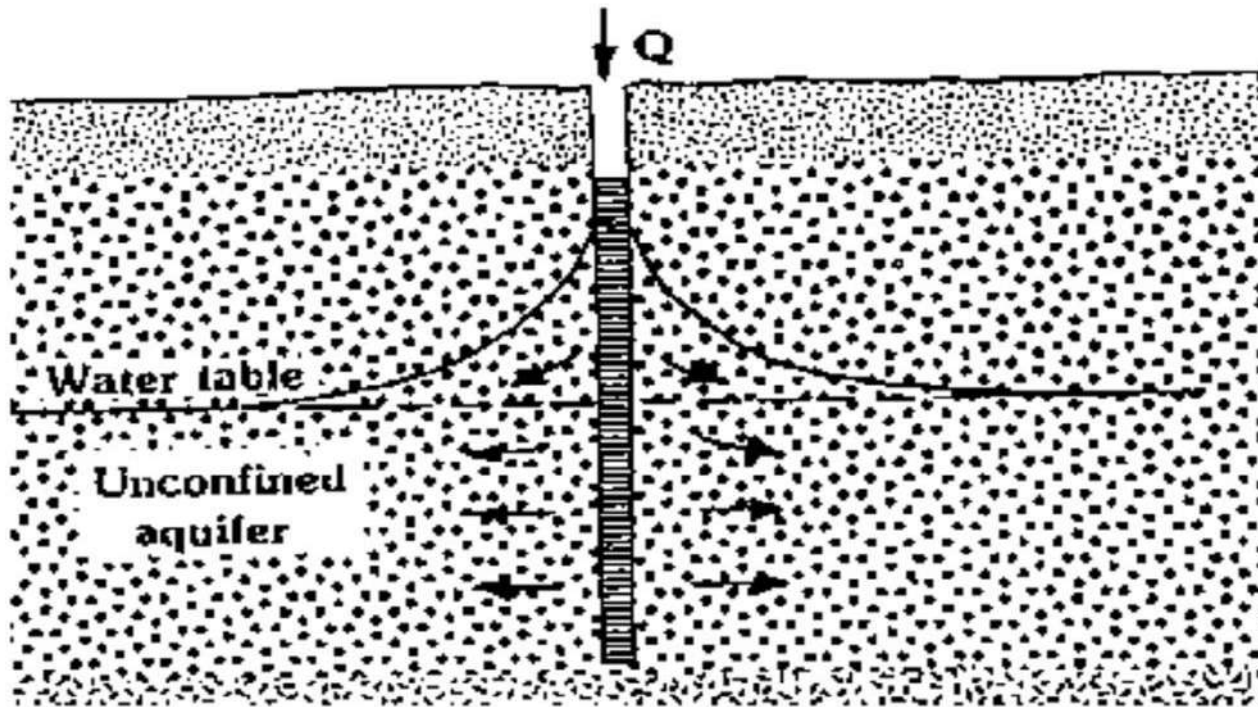


Managed Aquifer Recharge (MAR) ADB Projects



Recharge Boreholes -

It is the direct opposite of a pumping well. A recharge well pushes back surface water into the groundwater system



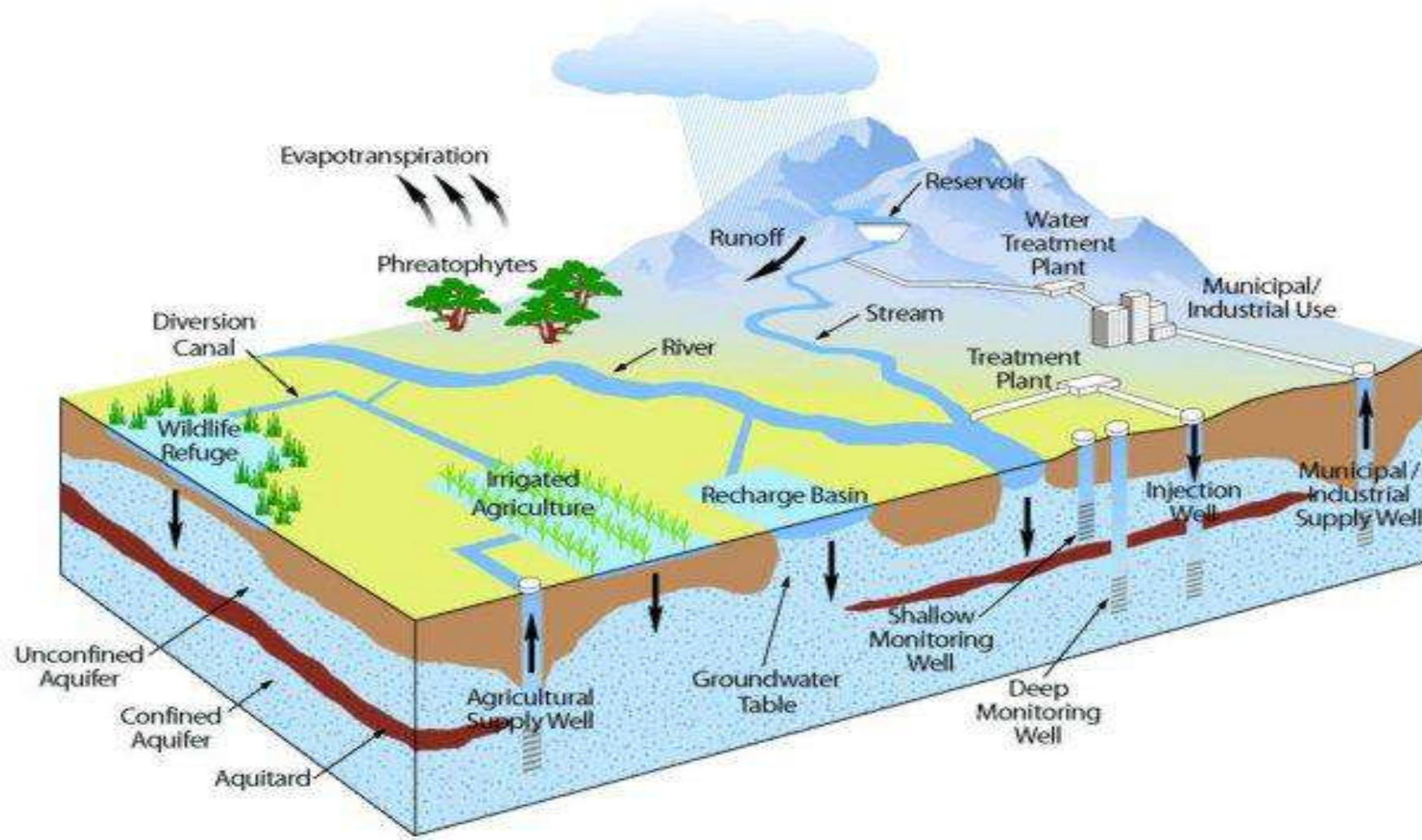
ABOVE SURFACE TUBE WELLS



ABOVE SURFACE TUBE WELLS



Water Cycle



Switzerland = Kazakhstan

Switzerland's technologies and methodologies of their communities' sustainable development with the efficient emergency mitigation, emergency preparedness, and response that support the additional financial income will be reasonable to adapt for Kazakhstan.

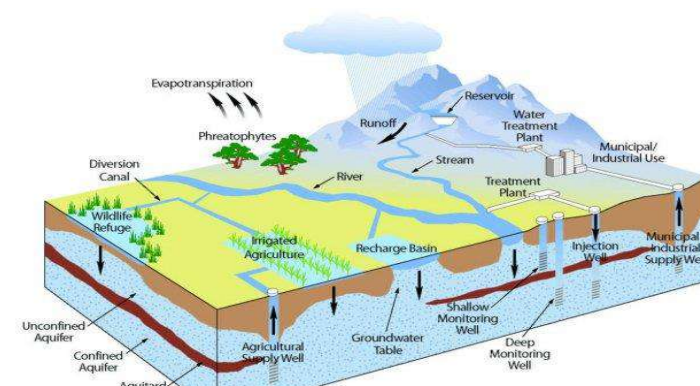
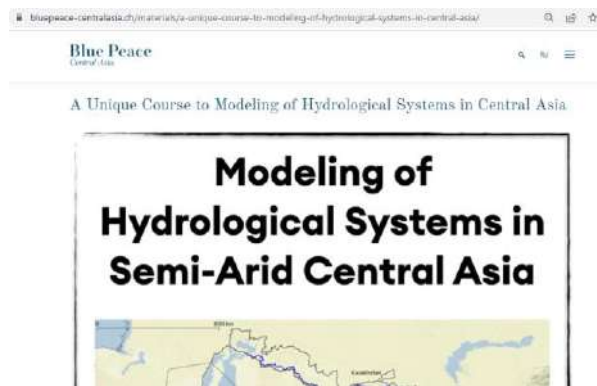
The Blue Peace CA is an ongoing project funded by the Swiss government,

https://drive.google.com/drive/folders/1Q-A5jAdqUOde0AftY9YMATaO4g8HHoIY?usp=share_link

https://drive.google.com/drive/folders/1b5FOPDmaCEyKEi-fX_XE55Oy1t9aJCO6?usp=share_link

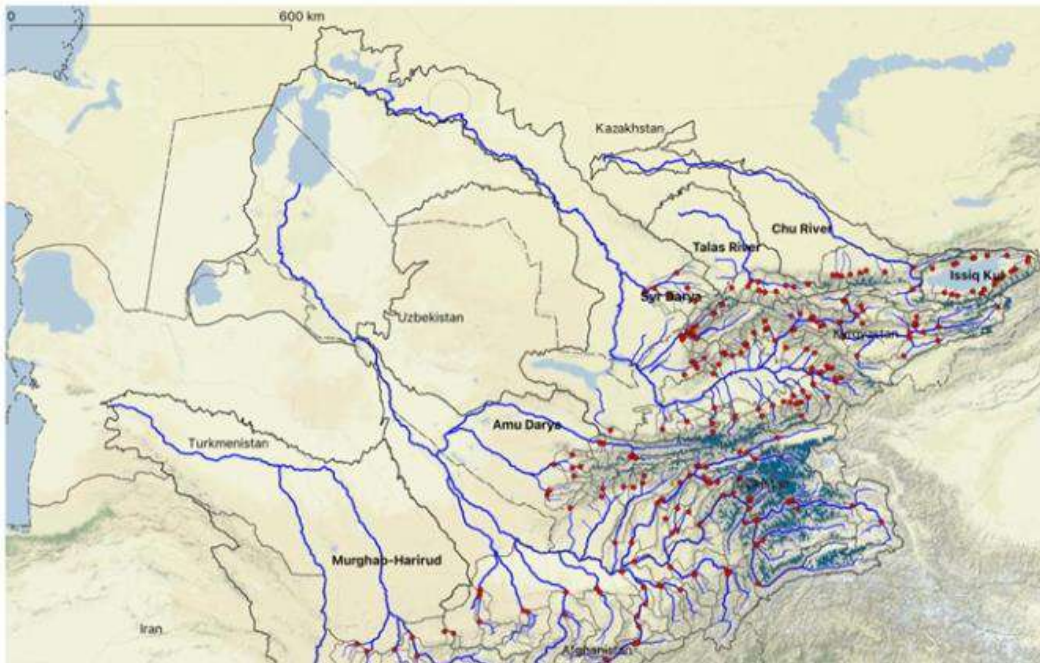
<https://www.bluepeace-centralasia.ch/materials/a-unique-course-to-modeling-of-hydrological-systems-in-central-asia/>

<https://bluepeace-centralasia.ch/>, <https://crealp.ch/>, <https://www.hydrosolutions.ch/>,



A Unique Course to Modeling of Hydrological Systems in Central Asia

Modeling of Hydrological Systems in Semi-Arid Central Asia



https://drive.google.com/drive/folders/1Q-A5jAdqUOde0AftY9YMATaO4g8HHoIY?usp=share_link

https://drive.google.com/drive/folders/1b5FOPDMaCEyKEi-fX_XE55Oy1t9aJCO6?usp=share_link

<https://www.bluepeace-centralasia.ch/materials/a-unique-course-to-modeling-of-hydrological-systems-in-central-asia/>

<https://bluepeace-centralasia.ch/>,
<https://crealp.ch/>,
<https://www.hydrosolutions.ch/>,

Germany = Kazakhstan

German-Kaz project “Urban water management - German expertise for Kazakh cities” (TERESA)

<https://teresa.inowas.com/>,

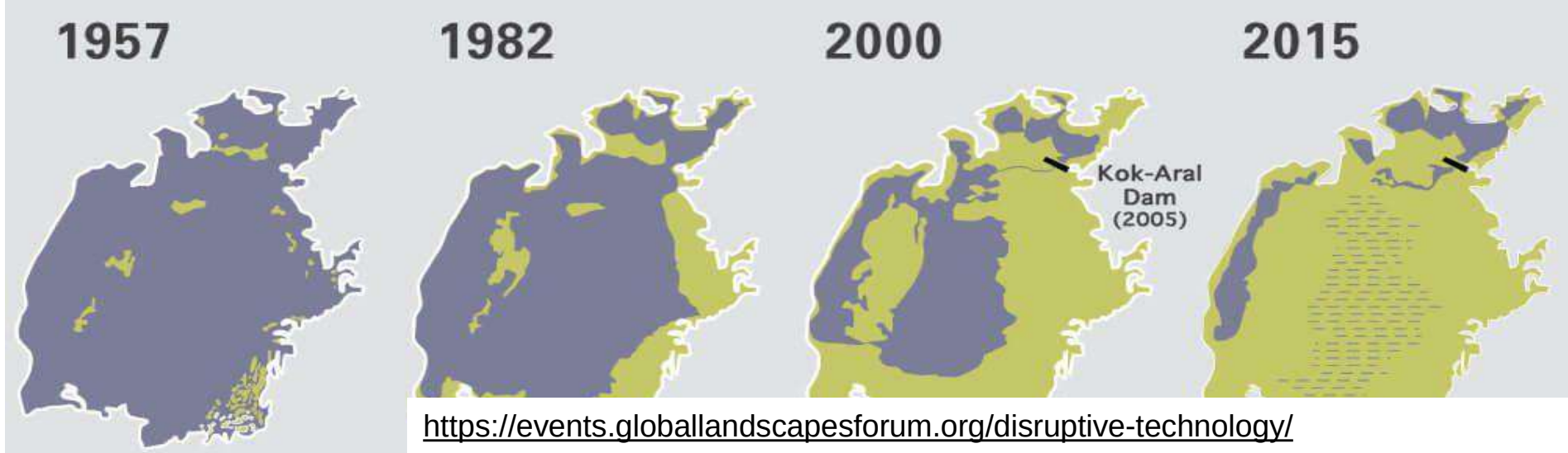
SusDrain (<https://www.susdrain.org/>),

<https://inowas.com>, <http://marpro.inowas.com/>,

<https://smart-control.inowas.com/training-material/>,

<https://teresa.inowas.com/partners-2/>)

Disruptive Aral



Nur-Sultan city, Taldukol lakes



https://www.internationales-buero.de/en/client_2.php

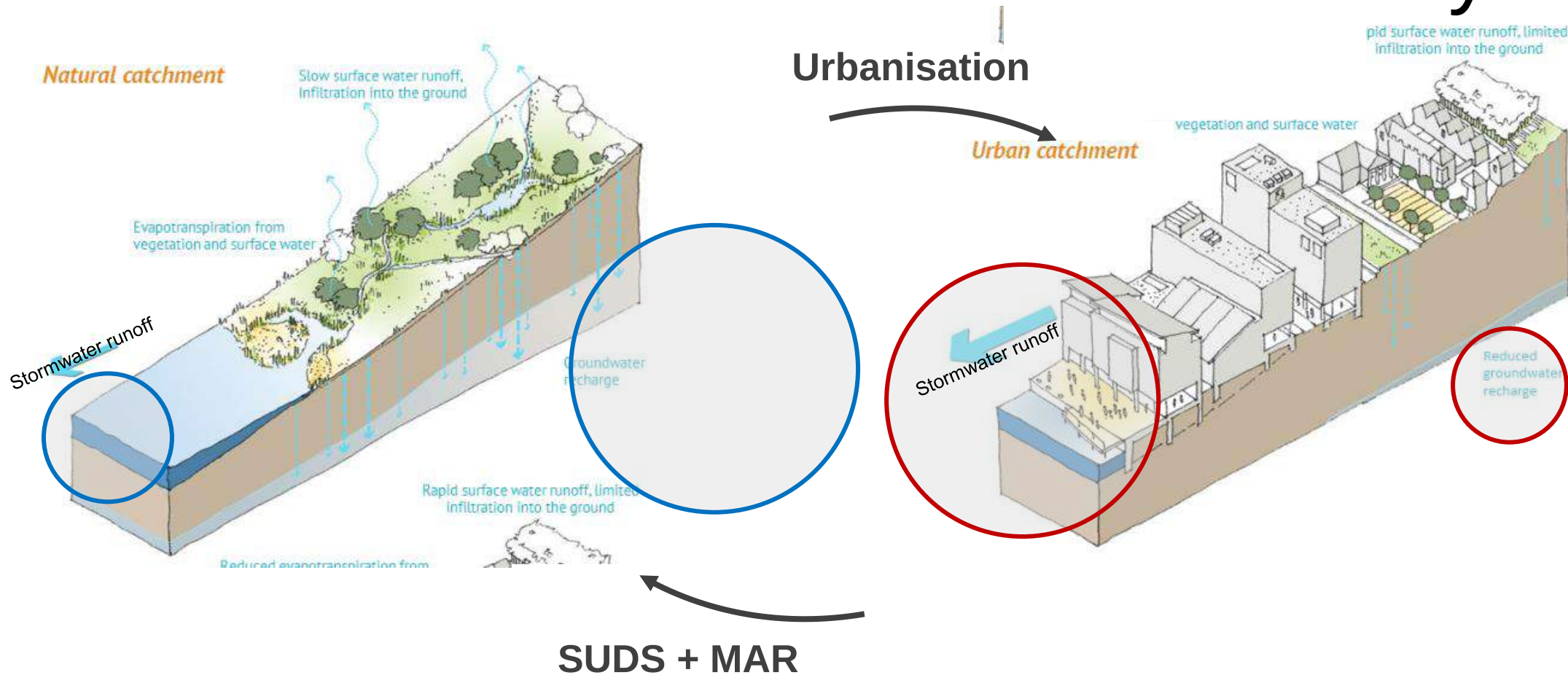


TERESA Project

- **Urban water management: German expertise for Kazakh cities**
- Project duration: February 2021 – January 2024
- **Objectives**
 - to foster the efficient use of water resources in urban areas of Kazakhstan through advanced simulation tools and technical solutions.
 - to support environmental planners and managers in Kazakhstan with adequate instruments for prevention, protection, and prediction of negative impacts of climate change on the local and regional water systems.



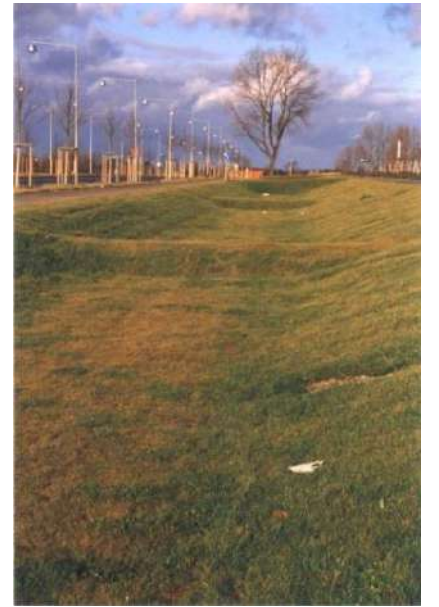
Astana city area



Source: www.susdrain.org

Sustainable Urban Drainage Systems (SUDS) use and enhance natural processes (retention, filtration, evapotranspiration, infiltration) to **reduce stormwater runoff** and **increase groundwater recharge**.

Germany



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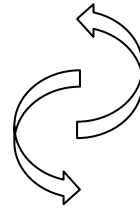
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German-Kazakh TERESA Project



Sub-project A **Modelling of urban surface water**

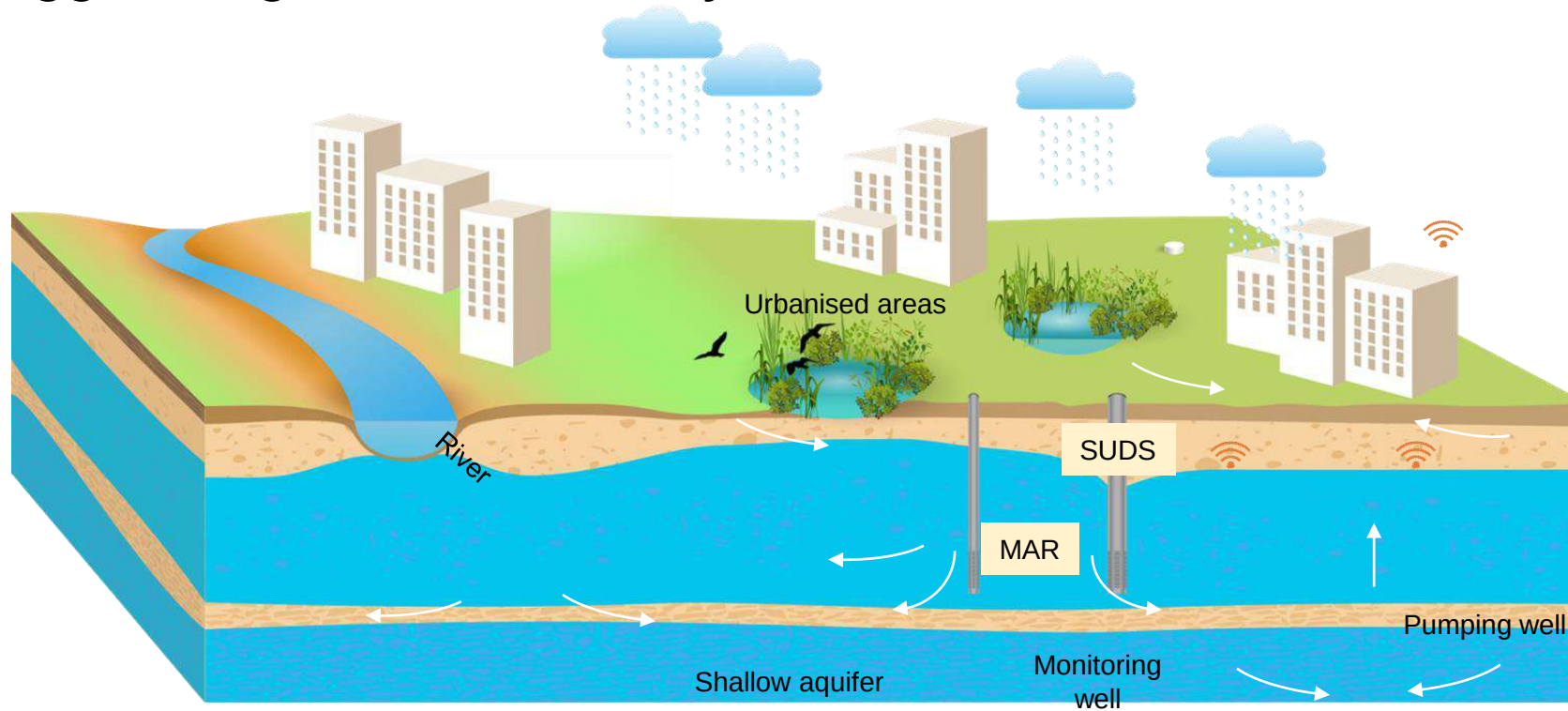
Analysis of the effect of sustainable urban drainage systems (SUDs) to reduce and to manage flooding using advanced simulation tools.

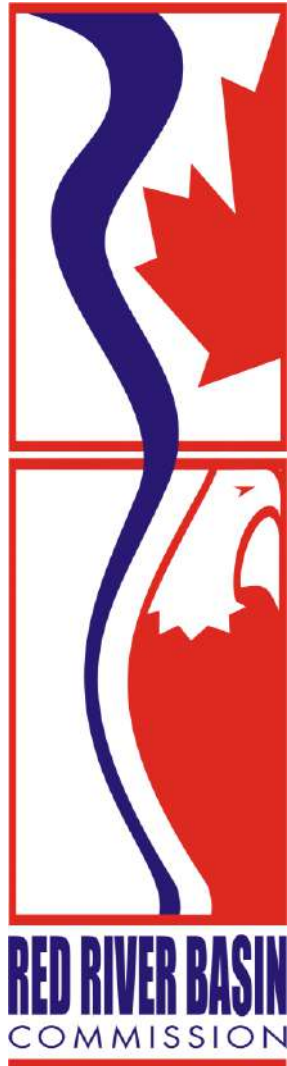
Sub-project B **Modelling of managed aquifer recharge**

Analysis of the potential of managed aquifer recharge schemes (MAR) to increase the cross-seasonal water availability using web-based simulation tools.

SUDS for groundwater recharge

Managed aquifer recharge (MAR): enhancement of SUDS benefits as added-value for a bigger range of urban ecosystems services.





Flood water usage in the Canada-US Red River Basin

<https://www.redriverbasincommission.org/>



Datasource: photo MWS

Canada – US Red River Basin

LAKE WINNIPEG WATERSHED



RED RIVER
BASIN

Canada – US Red River Basin

FLOODING
DROUGHT
WATER
POLLUTION



Canada-US Flooding



Strong linkage:

- **Flooding**
- **Nitrates – phosphates contamination**



Canada – US Prairie Droughts



- 1906
- 1936-38
 - Quarter million people displaced
- 1961
- 1976-77
- 1980
- 1984-85
- 1988
- 2001-2003
 - “the worst ever?”
 - \$3.6 B Ag /\$5.8 B GDP
 - 41,000 jobs lost

Water pollution

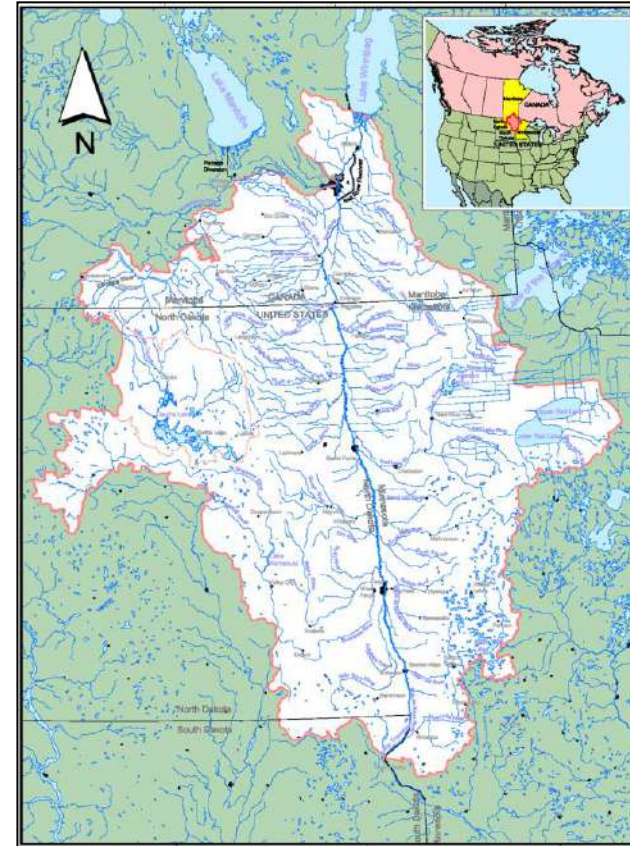
Nitrates - phosphates
Fertilizers - sewage



Algae Blooms

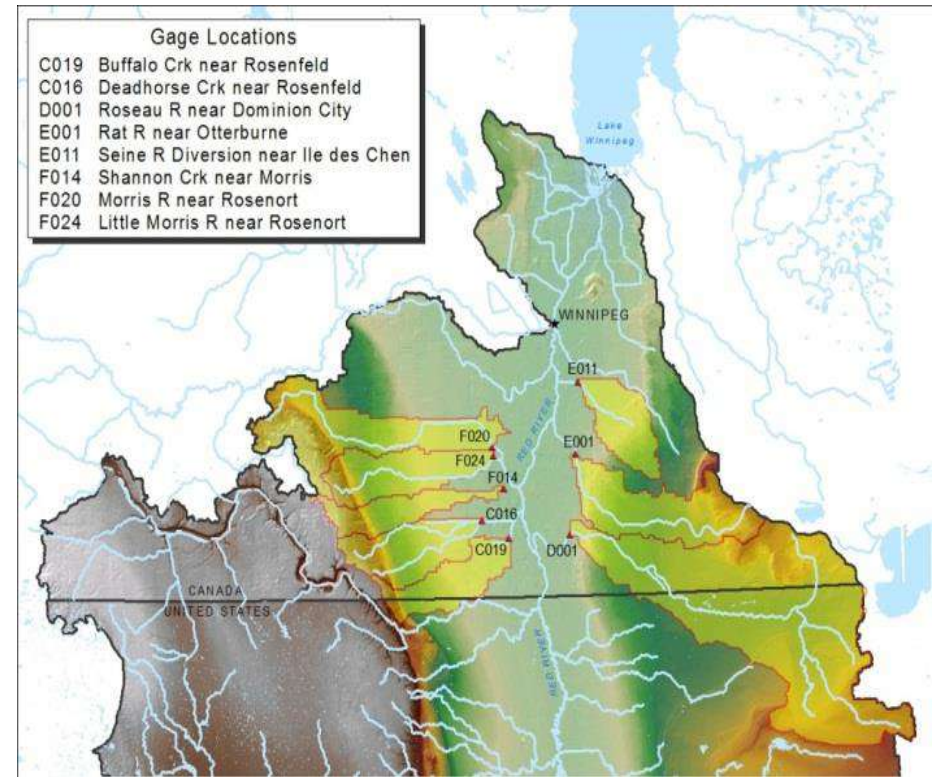
Basin wide Flood water use strategy for agriculture

- Reduce future flood damages by reducing flows
- Retain water upstream
- Construct multiple storage facilities distributed throughout the basin



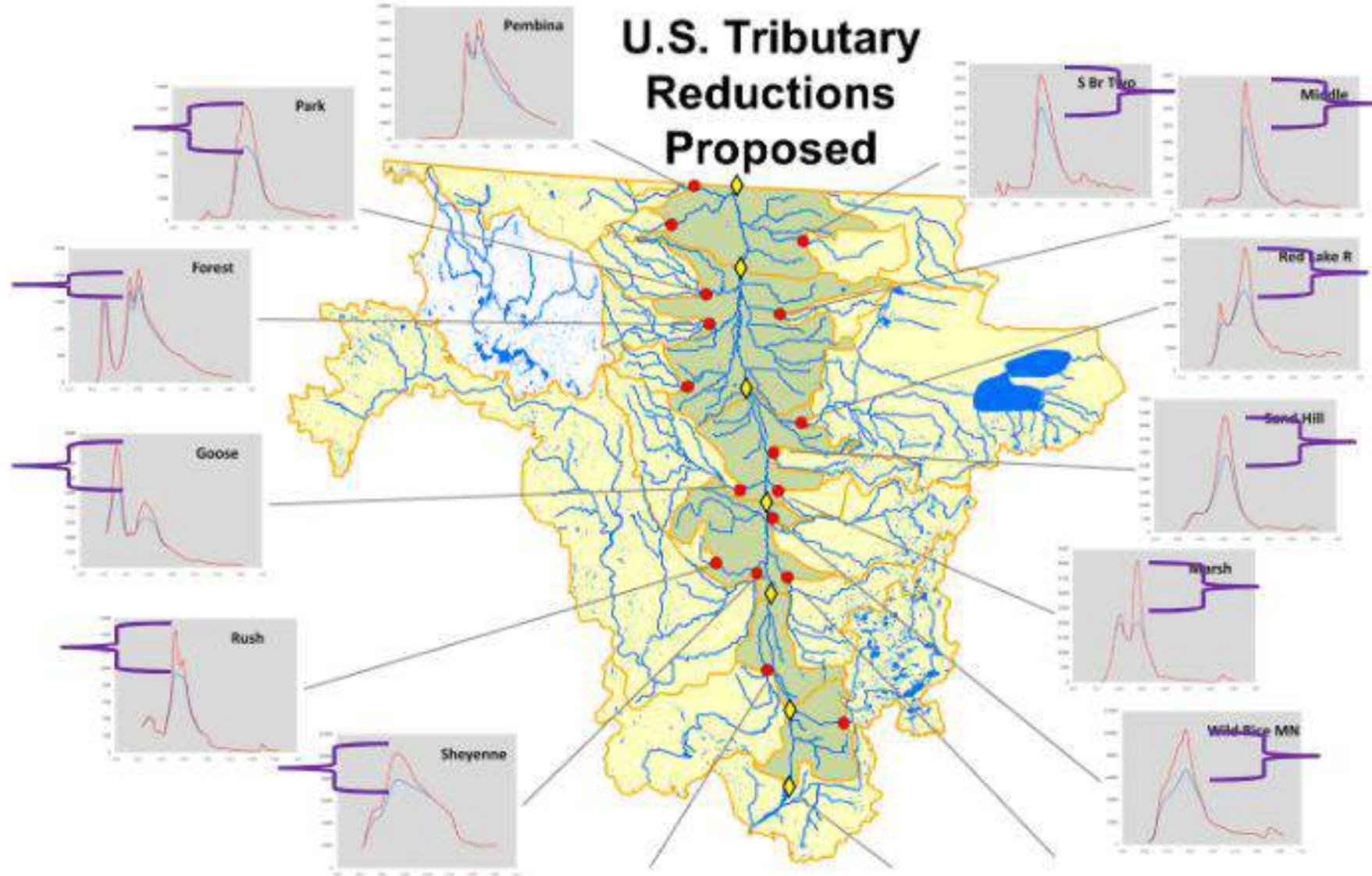
Flood water use for agriculture

- Select a realistic goal
 - 20% peak flow reduction (1997 flood)
- Develop models
 - Hydraulic
 - Hydrologic
- Quantify the flow reduction for each sub watershed
- Develop implementation plans



Modeling Tools

U.S. Tributary Reductions Proposed



Sustainability



**Localized
MAR
Drainage
System on
Agro Farms**

Sustainability

