Collected Minutes Stakeholder Workshops Pune, February 2019

How to use these minutes

The participant lists for all workshops can be found in the Excel file "Workshop Participants.xlsx"

The minutes you find below were taken during the Stakeholder Workshops in Pune on 18-20 February by team members or (in rare cases) by local support staff. The minutes are categorized according to the agenda and numbered consecutively. On the next page, you will see the agenda followed by an overview of sessions and related materials. The overview includes links that allow you to directly jump to the section you are interested in. In the case that a session involved group work, you may again find links, which lead you to each group. The given group task is mentioned at the beginning of these sessions. At the end of each section, you can go back to the overview by clicking on "back to session overview". The overview provides also information about material, which was collected in addition to the minutes, i.e. audios, posters, and slides.

To simplify your navigation through the document and make it easier to find the information you are looking for, here is a short summary of the stakeholder workshops' content and of the kind of information, you can expect to find:

A short welcome and getting to know each other was followed by a presentation/key note about the project including a Q&A for participants. (Presentation slides and audio of Q&A in BOX, short minutes below). The rest of the morning was devoted to a group work on the current situation in the FWE areas. The questions "How has the situation regarding food, water, or energy changed in the last two

decades? How have you reacted to those changes?" were discussed in four different groups (agriculture (2x), citizens, sustainability perspective). The minutes taken include changes and corresponding challenges observed by the participants as well as their coping strategies, wishes, and demands. You can also find some discussion points. The audio files, which are provided as additional material, last about ten minutes and are records of the presentation of group work results after discussion.

The afternoon shifted the attention from the present to the future. Raphael Karutz presented four different perspectives on future developments within SSP2 (water scarcity, urbanization, transformation of agriculture, energy demand). Subsequently, participants discussed in four groups – each taking a different perspective as a starting point – how the specific perspective would affect their lives and how they would deal with arising challenges and opportunities. Please find all these aspects covered in the minutes. The following presentation of group work results is again documented on audio only. The day ended by a feedback round and presentation of next steps. Some impressions are noted down in the minutes. At the very end you find some notes of the next day's team reflection on the workshop.

In summer 2019, the project team prepared a Documentation of the Stakeholder and Expert Workshops in Pune intended for participants and the public. Please refer also to this document for impressions and summarized facts, key points and outcomes. Further, refer also to the internal Expert Workshop Documentation and the summary of the Transfer Day. The latter's goal was to gather and systematize the challenges expressed by participants of the Stakeholder Workshop to be able to present them to the experts.

Agenda Resource User Workshop 18 February 2019, Pune

Time	Agenda Item
09:00	Welcome and getting to know each other (1)
09:45	Introduction into the project and keynote (1)
10:30	Break
11:00	Group work on the current situation in the areas FEW (2)
13:00	Lunch Break
14:00	Presentation of group work results (2 – audios)
14:45	Looking into the future: group work on future perspectives (3)
16:00	Break
16:15	Presentation of group work results (3 – audios)
17:00	Discussion, Synthesis, Next steps (4)
18:00	End of the workshop

Overview: Sessions and Material

Session	Material
1) Welcome and getting to know each other // Introduction into the project	- Minutes: ***Check-in and intro to the project*** – - Audios: ***1) Feb. 18 ProjectIntroQ&A_Pune SH-WS***– 00:20:55 - Posters: ***1) Motivation for attending_Pune SH-WS*** - Slides: ***1) FUSE_SH-WS_MainSlides_18-Feb-2019***
2) Group work on the current situation in the areas FWE	- Slides: ***.) FUSE_SH-WS_ModerationSlides_18-Feb-2019*** – #3-4
2a) Agriculture 1	- Minutes: ***Presentation of challenges/coping/changes*** – - Audios: ***2a) Presentation Challenges Agriculture 1_Pune SH-WS*** – 00:09:55 - Posters: ***2a) Agriculture 1 Matrix_Pune SH-WS***
2b) Agriculture 2	- Minutes: ***Presentation of challenges/coping/changes*** – - Audios: ***2b) Presentation Challenges Agriculture 2_Pune SH-WS*** – 00:12:09 - Posters: ***2b) Agriculture 2 Matrix_Pune SH-WS***
2c) Citizens	- Minutes: ***Presentation of challenges/coping/changes*** – - Audios: ***2c) Discussion Challenges Citizens_Pune SH-WS*** – 01:35:37 ***2c) Presentation Challenges Citizens_Pune SH-WS*** – 00:18:16 - Posters: ***2c) Citizens 1_Pune SH-WS*** ***2c) Citizens 2_Pune SH-WS*** ***2c) Citizens 3_Pune SH-WS*** ***2c) Citizens 4_Pune SH-WS*** ***2c) Citizens 5_Pune SH-WS*** ***2c) Citizens Matrix_Pune SH-WS***
2d) Sustainability Perspective	- Minutes: ***Presentation of challenges/coping/changes*** – - Audios: ***2d) Presentation Challenges Sustainability 1_Pune SH-WS*** – 00:08:19 ***2d) Presentation Challenges Sustainability 2_Pune SH-WS*** – 00:00:16 - Posters: ***2d) Sustainability Matrix_Pune SH-WS***

3) Looking into the future: Group work on future perspectives	- Minutes: ***Short summary of Perspectives presented*** – - Slides: ***.) FUSE_SH-WS_ModerationSlides_18-Feb-2019*** – #6-7 ***3) FUSE_WS_Scenarios_18-20-Feb-2019***
3a) Water Scarcity	- Minutes: **Presentation of scenarios and synthesis discussion** – - Audios: ***3a) Presentation Scenario Water Scarcity_Pune SH-WS*** – 00:11:00 - Posters: ***3a) Water Scarcity Mindmap_Pune SH-WS***
3b) Urbanization	- Minutes: **Presentation of scenarios and synthesis discussion** – - Audios: ***3b) Presentation Scenario Urbanization_Pune SH-WS*** – 00:08:02 - Posters: ***3b) Urbanization Mindmap_Pune SH-WS***
3c) Land Transformation	- Minutes: **Scenarios discussion and presentation: Land transformation in rural areas** – - Audios: ***3c) Presentation Scenario land transformation_Pune SH-WS*** – 00:08:40 - Posters: ***3c) Land Transformation Mindmap_Pune SH-WS***
3d) Energy Demand	- Minutes: ***Presentation of scenarios*** – - Audios: ***3d) Discussion Energy Demand_Pune SH-WS*** – 00:51:33 ***3d) Presentation Energy Demand_Pune SH-WS*** – 00:08:27 - Posters: ***3d) Energy Demand Mindmap_Pune SH-WS***
4) Discussion, Synthesis, Next Steps	- Minutes: ***Outlook and Check-out*** – - Audios: ***4) Final Discussion_Pune SH-WS*** – 00:18:57 - Posters: ***4) TakeAways_Pune SH-WS*** - Slides: ***.) FUSE_SH-WS_ModerationSlides_18-Feb-2019*** – #8-9
5) Reflection	- Notes: ***Reflections on Stakeholder WS***

Welcome and getting to know each other // Introduction into the project and keynote

Additional material for this session:

- ***Audio:*** ***1) Feb. 18 ProjectIntroQ&A_Pune SH-WS – 00:20:55***
- ***Poster:*** ***1) Motivation for attending_Pune SH-WS***
- ***Slide:*** ***1) FUSE_SH-WS_MainSlides_18-Feb-2019***

Title of the session: Check-in and intro to the project

- ***Time: 9:30 – 10:40***
- ***Minutes keeper:***

Short description of the topic, setting and agenda of the session

- Warming up exercises (motivation & expectation), FUSE project introduction
- 7 tables with 21 participants
- Agenda:
  - Check-in
  - Presentation of FUSE project and Q&A

Check-in answers (main points without names)

- Sustainable development synergies for Upper Bhima Basin
- Exchange of thoughts and insights with different people
- For a better future for Pune, learning how to face critical issues in FWE
- Important to use resources in a natural way (e.g. organic farming), understanding FWE linkages
- Current focus is more on urban areas, villages and rural areas should not be neglected
- Sharing our thoughts with others

Questions and answers after input (main points, ideally clustered)

- Crop signature for maps? ->we did it using satellite pictures with local data. Remote sensing can help get specific signature for different crops
- Analysis of political economics will be included. Already experience of political economics in sugar industry.
- Current rain harvesting promotion in Pune, easy in making policies but hard to implement
- Migration observations: population decreasing in certain severely polluted rural regions (e.g. to slum areas), people might move out due to ill conditions (e.g. drought in 1962) and back when situation turns better.
- How to collect and valid data such as energy-related data in rural areas? ->we can only understand what is supposed to do, not what is actually going on. But we can verify it in our own ways (e.g. surveys with n=2000, we would like to have your input in what kind of questions we should ask in the survey).
- Solutions needed dealing with water pollution issues
- Lack of clear rural development plans. No sustainable income for local farmers.

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Group work: current situation in the areas FWE

***See presentation: ".) FUSE_SH-WS_ModerationSlides_18-Feb-2019"* #3-4**

Task given by FUSE team:

Group work (4 different groups)

Think of your current situation, the current situation of farmers, citizens, small companies:

- How has the situation regarding water, food, or energy changed in the last 2 decades?
- How have you reacted to those changes?

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Group work on the current situation in the areas FWE – Agriculture 1

Agriculture 1

Additional material for this session:

- ***Audios:*** ***2a) Presentation Challenges Agriculture 1_Pune SH-WS - 00:09:55***
- ***Posters:*** ***2a) Agriculture 1 Matrix_Pune SH-WS***

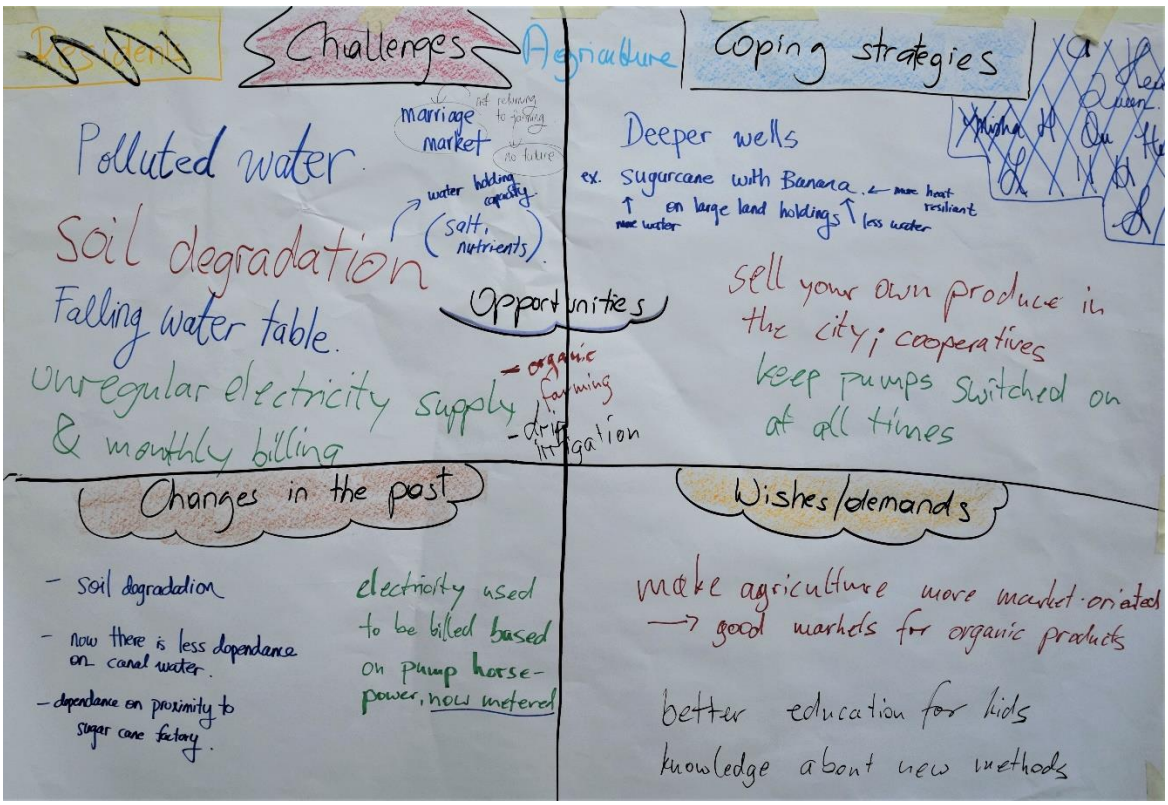
Title of the session: Presentation of challenges/coping/changes

- ***Time: 11.20 – 13.00***
- ***Minutes keeper:***

Short description of the topic, setting and agenda of the session

Challenges of users and coping mechanisms

- **Summary of the challenges, coping, changes**



Food / Agriculture

Challenges:

- Soil has become hard, 20 years ago this was not a problem
- Farms are getting smaller; average landholding size is less than 1 hectar
- Men who farm have a hard time of finding a partner, women prefer men with jobs in the city

Responses

- Composting (incl. cow manure) is good for enriching the soil, government programs are needed for this
- Some farmers are digging up soil from below and put it on top (energy intensive)
- More fertilizers are being used to deal with soil quality problems

Group work on the current situation in the areas FWE – Agriculture 1

Other infos:

- Vegetable growers cooperate (21 people) each growing a different veg, sell together in the cities: it is risky due to volatile prices, however, and high transport cost
- How do they decide which vegetables to grow? They understand what consumers want due to selling in the city and talking to them,
- they adopted drip irrigation, it saves money, person labour is 500 Rs per day
- selling directly to the market is supported by new gov schemes: selling places are made available, this creates contact with consumers
- Sugarcane: they get a fixed price of 2600 Rs per ton at the mill, one acre can produce 90 tons
- Other cropping options are more prone to climate change, sugarcane isn't
- Vegetables make a lot of work, you face market risk, that's why sugarcane is preferred
- One sugar farmer shifted to other crops because his mill got bankrupt
- Sugarcane farmers have side-jobs, it does not require much work

Water

Challenges

- Water pollution through insufficient sewage system, bad waste management, fertilizer use, high salinity – all result in low yields
- Almost all farmers have groundwater wells, many of them grow sugarcane
- Leveling of land has made rain water harvesting more difficult, they increasingly have to use groundwater wells
- Water user association does not work for them, they are corrupt
- All farmers in the discussion use both ground- and surface water (it is not like this in general): 50/50 on average groundwater and canal water
- Around dams, no drilling is permitted in a certain perimeter but everybody does it
- Everybody is getting a well, there is no common management, competition for water
- Groundwater authorities require payments, "they only come to collect taxes"
- Documents for irrigation subsidy scheme are difficult to fill in, payments are delayed
- Their biggest challenge: water quality

Responses:

- If well yields are low, they might call tankers for irrigation water
- They use checkdams to recharge the aquifer, village is sharing the cost and labour (this is just one case)
- They also lift surface water and recharge the aquifer
- Wells get dryer throughout the year, they have to redrill
- How often did you deepen your well in the past ten years? It is going deeper and deeper, dependence on groundwater is growing due to less rain
- They always have their pumps on (both groundwater and canals)

Other infos: Expense of groundwater drilling: 50,000 RS per well, 100 Rs per foot if you go deeper

Energy

Group work on the current situation in the areas FWE – Agriculture 1

- Flood irrigation is increased through availability of cheap energy at unreliable hours (mainly for sugarcane), the soil becomes very salty due to that
- Load shedding creates problem in the night (they never switch off the pump), there is corruption concerning the supply hours, the supply schedules do not work
- Mahadiscom: they do not get a connection until they have a groundwater license
- Billing process with Mahadiscom: Was biannual, now shifted to monthly bills, profits are one-time only though, this is a challenge for them
- All have meters now, it used to be a horsepower charge
- Since when do you have meters? 1 year ago
- Corruption: they do not get a meter, technical problems cannot be fixed unless they pay off the responsible person
- One farmer shows his bill, it is 350 Rs for two months of power supply - this seems to be a common amount for a power bill, the others confirm
- The sugarcane producers get bagasse cogen power quite cheaply, this could be a solution to their electricity challenges, solar as well, but the price is high

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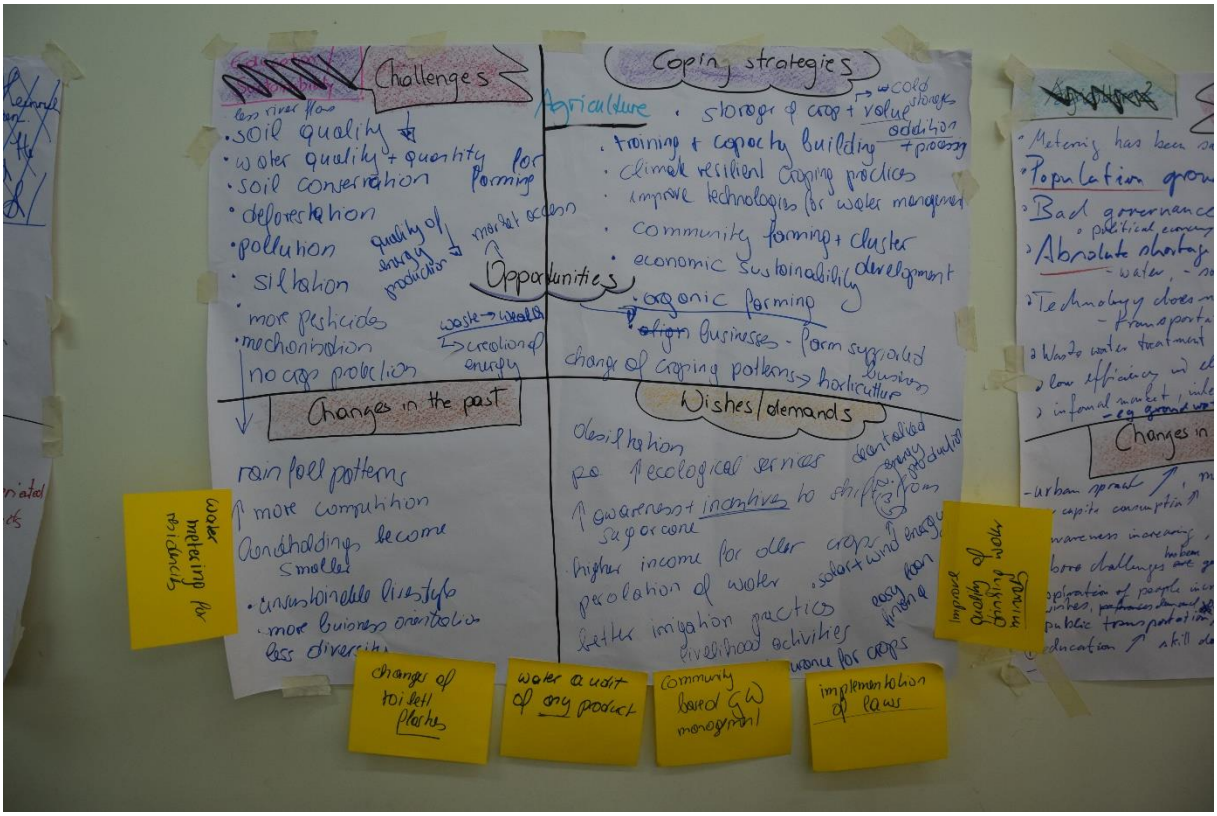

Agriculture 2

Additional material for this session:

- ***Audio: 2b) Presentation Challenges Agriculture 2_Pune SH-WS – 00:12:09***
- ***Poster: 2b) Agriculture 2 Matrix_Pune SH-WS***

Title of the session: Presentation of challenges/coping/changes

- ***Time: 11.20 – 13.00***
- ***Minutes keeper:***

- **How has the situation regarding water, food, or energy changed in the last 2 decades?**
- **How have you reacted to those changes?**

Water

In the Vidharbh area where my village is situated rain water was present for 8 to 10 days continuously earlier. Rains were prolonged earlier. Now there is no water continued in the

There is lots of change in the landuse pattern in the area has happened. Siltation of the dams have happened. Private dam owners like Tata they do dredging for de-siltation of the dams. The removed silts are spread over the agriculture fields and due to its fertile nature it is used for agriculture. This is a good practice done by private dam owners. But you have to check this information and verify this. Govt should also adopt these facilities for the areas under their jurisdiction.

Farmers should get Rs 100,000 per acear under cultivation.

We are facing the problem of people participation. Because of their changing perspective and urbanisation style of changing agricultural services like milk supply, etc.

In this area about 50 to 60 percent land is covered with irrigation in this area.

This is a hilly area, most of the crops grow in rainy seasons. It is rain fed and it need not bother to irrigate that land. But in the non-rainy season one needs irrigation for sugarcane.

Western lifestyle that is adopted is causing the problem in the area due to excessive input intensive agriculture is becoming very uneconomical.

Local variety of the cow is not being in use, which used to provide manure. This has impacted the soil fertility. Which caused for increased input for the agriculture and unsustainable for the farms.

Now the number of animals per family is reducing causing less availability of natural manures. This also caused increase in the use of chemical fertilisers.

Yield has reduced due to decreasing manure use, increased use of fertilised and increased used of water for irrigation. This has caused increase in the electric conductivity of the soil and causing alkalinity of the soil affecting the soil health and fertility.

The quality of the water supplied is not good due to acidity of the water. This is happening close to Pune.

20 years back the quality of the river water was good and now it has become acidic due to eutrophication of the river water, causing growth of river hyacinth, decrease in fish population.

The population of the village has also increased this cause increase in land price, increase in the pollution level.

Cannel has its impact on the soil and water in its surrounding.

Earlier the cropping was different and it was mostly local variety of crops are now not grown.

What can be done?

Reduction of pollution is required to be done including the river water pollution, solid waste. Soil erosion should be checked or stopped and de siltation of the dams should be done.

Use of chemicals in our daily lifestyles like shampoo, toilet cleaners, etc should be stopped.

Give money to the farmers/villagers and promote them to grow forests and plantations of local varieties. Most importantly he should be getting money to compensate his incomes that is 100,000 per acre. This can be done through some way of payment for the ecosystem services. This will encourage farmers to use half of their land holdings for growing trees and forests, also ensuring their incomes for their subsistence.

Every farmer in this area wants to change. But they want to have their own economy fulfilled too.

Horticulture plantation doesn't have market. Farmers are not getting correct appropriate price for the horticulture produce. Some farmers have formed groups like farmers producer organisation to reach to the market directly and sale their produce there to get fare price of their produce.

Employment of technologies which reduces water consumption and water pollution loads.

What is being done?

We are trying to reduce the use of herbicides. Herbicides are used as the labour cost is very high for removing the herbs from the fields.

Tasting of soil and water is very important to be done.

Climate resilient cropping pattern.

Support with allied economic activities to support farming.

Market has competition from the supply from other states.

Practice should more towards organic farming, but organic farming is not economically viable, it should be made economically viable and market has to be provided to the organic produce to the farmers.

There should be ways for regular income. Cash crops especially sugarcane give big money in one chuck and this money is not used sustainably by family farmers.

Why should a farmer change to non sugarcane crop if it is not giving them equal or more earnings? What is the motivation for them to be benevolent for the society? Can their income be ensured of the similar level with similar low input and less hassle for them as farmers in growing other crops. Government and consumers should come up with such policy to compensate them for the socio-ecological services provides by the farmers. Bring the socio-economically viable alternatives like payment services, etc.

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Group work on the current situation in the areas FWE – Citizens

Citizens

Additional material for this session:

- ***Audios:*** ***2c) Discussion Challenges Citizens_Pune SH-WS – 01:35:37***
  2c) Presentation Challenges Citizens_Pune SH-WS – 00:18:16
- ***Posters:*** ***2c) Citizens 1_Pune SH-WS***
  2c) Citizens 2_Pune SH-WS
  2c) Citizens 3_Pune SH-WS
  2c) Citizens 4_Pune SH-WS
  2c) Citizens 5_Pune SH-WS
  2c) Citizens Matrix_Pune SH-WS

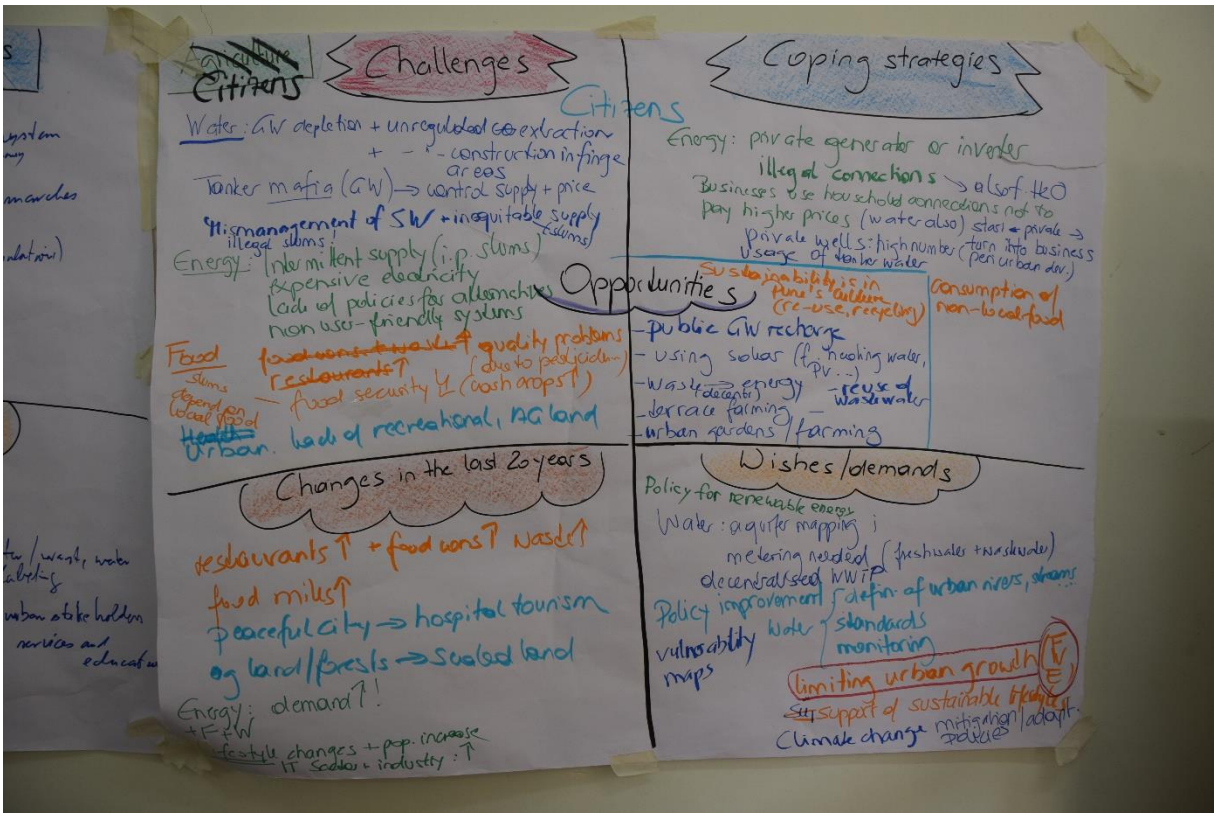
Title of the session: Presentation of challenges/coping/changes

- ***Time: 11:20 - 13:00***
- ***Minutes keeper: /***

➢ **Short description of the topic, setting and agenda of the session**

- FWE challenges for citizens
- 1 table with 6 participants, host:
- Agenda: group discussion on FEW challenges for citizens

➢ **Summary of the challenges, coping, changes (main points, indicate names per group, but minutes without names)**



<u>Changes in the last 20 years:</u>

Group work on the current situation in the areas FWE – Citizens

- Population growth
- FWE demand change due to city development: increase in water and energy consumptions, increase in food consumption and waste
- Environmental issues: more pollution, less green area
- Industrial changes: Pune turns from a peaceful city to a centre of hospitals and tourism, growth in IT sector and industry
- Lifestyle changes: more vehicles, more electrical appliances, food miles increase

Challenges:

- Mismanagement of surface water
- Groundwater depletion and unregulated extraction
- Tanker water supply and price are controlled by tanker mafia
- Unregulated construction in fringe areas causing pressures on infrastructure
- Inequitable FWE supply
- Water and electricity theft in undeclared slums
- Intermittent electricity supply (especially in slums)
- Lack of policies and user-friendly systems for alternative renewable energy sources
- Food security both in terms of quality and quantity
- Decreasing recreational and agricultural lands

Coping strategies:

- Use of well water and tanker water
- Private generator or inverter coping with electricity supply interruptions
- Illegal connections for water and electricity in undeclared slums
- Commercials use residential connections to avoid higher prices
- Consumption of imported food

Wishes and demands:

- Clear definition of urban rivers, streams, water standards and monitoring
- Metering for both piped water and waste water
- Decentralized waste water treatment planning
- Aquifer mapping
- Policy for renewable energies
- Support of sustainable FWE management
- Vulnerability maps
- Limiting urban growth
- Mitigation and adaption policies for climate changes

Opportunities:

- Sustainability is in Pune's culture
- Public groundwater recharge
- Reuse of waste water

Group work on the current situation in the areas FWE – Citizens

- Use of solar energy
- Decentralized waste – energy conversion
- Urban agriculture and terrace farming

➢ **Discussion points raised (summary, key findings)**

- <u>Water-related:</u>
    - Climate change -> increasing temperature, rainfall is now much more intense (in only 2 months)
    - Water availability increases due to dams
    - Piped water supply:
        - Lack of water metering. A lot of water is wasted (e.g. sometimes taps are kept open) -> education and awareness raising can be the solution to this.
        - Water supply is not continuous. Water is often available in mornings and evenings. Storage tanks are commonly used to bind the bridge.
            - Normal households have no problem with intermittency
            - Declared slums normally use water from commune standpipes
            - Undeclared slums use unofficial taps (water stolen from public network, without any payment), and tanker water ->huge groundwater problems
        - Commercials have piped water connections, and might need additional tanker water. They might use residential connection to avoid higher tariff.
    - Waste water treatment:
        - No efficient waste water treatment planning due to cost and hills -> decentralized waste water treatment and metering could be an ideal solution
        - Recycling water and waste is expensive, and needs to be subsidized
        - Ecological waste water treatment has lower operational cost but higher fixed cost (investment cost) -> developers don't want it
    - Groundwater:
        - No official data available.
            - According to an estimation from a NGO, approximately 30% of the total water use in Pune comes from groundwater (around 13 TMC). The current hydro-geographic estimation of groundwater capacity in Pune is 1.5 TMC.
            - Mapping of key aquifers exists, and needs to be used to target groundwater recharge (e.g. to education, institute, military)
        - Around 80000 tube wells in Pune city.
        - Townships use either well water or tanker water. Certain townships rely only on tanker water. They are normally built without roads and water infrastructure (public network and waste water treatment).
            - Policy is incentivizing complexes (townships) with aim of rainwater harvesting, however they still end up depending on groundwater and tanker water. In some areas, groundwater recharging is impossible.
        - Groundwater extraction is unregulated.

            - Rules are not well defined, anybody can dig a tube well.
            - Some tanker water extraction point runs 24 x 7 (billions of rupees of revenue). One filling costs around 1000 rupees per tanker, while the revenue is approximately 1.6 million rupees.
            - Tanker use of groundwater is not sustainable, and should not be permitted. It should be at least regulated. Tanker water suppliers might threaten users who want to switch suppliers.
        - Public ventures would be important for groundwater recharging
    - Rainwater harvesting incentive in Pune, but not properly implemented
    - 18 TMC is held by Tata for power dam for Mumbai. In future, there will be riots.
    - Example: new developments in Wogholi, Hinjawadi and Dhnyari (no piped water supply) -> village council will only supply 5-10k residents.
        - Construction license was illegally taken by the developer assuring that they would provide water (constitutional obligation of village/town)
        - Completion certificate was given before pipes were completed. The developer gave water supply guarantee based on expensive tanker water and bore wells which might run dry
        - If construction licence was not delivered, there wouldn't be any groundwater problem
        - Main point: city should not grow beyond existing infrastructure system
- <u>Energy-related:</u>
    - Electricity metering is well implemented with transparent billing (increasing block tariff)
    - No 24 x 7 supply:
        - No electricity supply on Thursdays in most areas
        - Around 2 hours in average of load shedding / supply interruption everywhere in summer (March – June)
        - Slum areas have many irregular supply interruption
    - Back-up system is necessary (commonly generator or inverter)
        - Expensive
        - More use of diesel generators because of electricity supply interruption -> more CO2 emission
    - Increase in solar heating
    - Gas heating is increased
    - Adopting renewable energies is not happening because of unfriendly policies
- <u>Food-related:</u>
    - Food was 100% locally produced two decades ago. With more and more immigrants, food consumption in Pune depends now largely on importation. People with medium or high income rely almost completely on imported food while slum households can only afford locally-produced food (with limited supply).
    - Agricultural land decreasing due to city development
    - More cash crops are cultivated.
- <u>Urban-related:</u>
    - Pune was a pensioners' city two decades ago, and then became an education hub, an IT hub, and now a hospital hub.
    - Migration-related:

        - Women are not willing to marry farmers, farmers are willing to change to any job in the city.
        - 160 km of river in Pune city. In 1960s, there was a dam break. Slum households relocated themselves near river banks in order to get water access.
- Urbanization-related:
    - Pune used to be a city on the bike. Now people use private cars more often because of lack of well-maintained public transportation (and rapid population growth)
    - City boundaries are always changing. No water infrastructure in the fringe area (e.g. no drainage, supply network, waste water treatment)
    - Reduction in agricultural and fishing activities due to pollution and urban development
    - Pune used to be self-sufficient both in terms of water and food.

Sustainability is in Pune's city culture. People are accustomed to reuse items and even food.

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Group work on the current situation in the areas FWE – Sustainability Perspectives

Sustainability Perspectives

Additional material for this session:

- ***Audios:*** ***2d) Presentation Challenges Sustainability 1_Pune SH-WS – 00:08:19***
  2d) Presentation Challenges Sustainability 2_Pune SH-WS – 00:00:16
- ***Posters:*** ***2d) Sustainability Matrix_Pune SH-WS***

Title of the session: Presentation of challenges/coping/changes

- **Time: 11:15**
- **Minutes Keeper:**

➢ **Short description of the topic, setting and agenda of the session**

Individual situation and coping strategies: **Sustainability Group**

➢ **Summary of the challenges, coping, changes (main points, indicate names per group, but minutes without names)**

<u>Current situation general and development in last 20 years</u>

- Generally positive development in Pune (participants expected better future for their children), e.g. service sector has improved, also better education
- (urban) sustainability concerns: **Increases** in
  - Population
  - Urban sprawl
  - General consumption pattern
  - water consumption
  - waste creation
  - Income gap
  - Regional differences
  - No. of private vehicles
- no public concern about ecological footprint
- **Urban transport is a major issue**: decreasin gshare of public transport, strong increase in online purchase/delivery (which also affects street vendors negatively)
- **Bad implementation of good laws**, e.g. plastic ban in Maharahstra/Pune: not implemented well, people don't follow.
- **Silo thinking**, not enough (critical) systems thinking, cross-cutting issues. Problem in terms of sectoral and regional interchange, e.g. urban NGOs usually do not consider regional scale
- Most of the public budget (Maharashtra) is fixed to salaries etc., very little available for projects, often not used wisely (e.g. street paving, expensive metro as prestige project…)
- Short sightedness in politics
- **Corruption**: Gvt is very aware of informality/corruption, involved.
- 96% of livelihoods **informal**, almost 40% of housing, 5% of Indians pay income tax
- Sense of urgency regarding sust. Issues in general public and increasing research work on issues
- Urban poor not heard, their ability to deal with combined challenges decreasing, increasing health issues (psychological), diabetes

Group work on the current situation in the areas FWE – Sustainability Perspectives

Water Challenges

- Pune has one of the best water supplies in India
- Good practices sabotaged in recent years, example metering: Water metering was stopped in 1997 → exchanged for property tax
- alternates daily, in summer availability sometimes only once per week
- No real rain water harvesting strategy by PMC
- PMC has little control about actual water consumption
- **Demand management would be crucial,** not implemented yet
- The carrying capacity for Bhima basin would need to be defined for proper management
- **Water quality downstream of Pune deteriorated** strongly, many people use individual **purifiers**, but livestock cannot and takes in pollution → humans take in with animal products (the same goes for the poorest people, who do not have purifiers)
- Lack of control in water extraction –water can be more expensive than milk (?)
- **Pune's water system is very old**, will not work for 24/7 program, pipes would need to be renewed
- Smart city mission: **Pune's 24/7** water program is based on area development and covers only 3% of Pune!
- Pune's water demand today: 16 TMC
- **Unequal water distribution** is a major problem
- **Slum/**villages: water often polluted: negative effects physically and mentally
- Slum dwellers also use canal/river water, not for drinking, but cleaning etc.
- 72% slum households have individual tap
- 20% of urban water use is based on groundwater: not regulated at all
- tanker water: mafia structures, mostly Non-potable, mostly groundwater
- Mah. Groundwater Act discussed for decades, still not implemented
- Better sewage treatment necessary, no use if treated partially (currently ca. 60% partially treated, 40% not at all, goes to river→ 100% needed!
- Riverfront development→ real estate project, river canalization→ flooding problem

Energy Challenges

- Electr connection (also in Slums!) metered (in slum atlas 90%)
- Energy efficiency measures often not implemented (positive example: contract with Tata to install LED streetlight, keeping the savings

Food/Agriculture Challenges

- Food supply not under PMC responsibility → not present in discourse
- Farmers do not earn enough money, most money goes to middle men→ direct marketing schemes needed

Migration

- Village Sustainable Development Plans would be needed to increase attractiveness of rural life
- Example: forest dwellers: how can they use honey and other resources to sustain livelihood, instead of migrating to cities?
- Processing industry in rural areas missing: e.g. cashew farmers

Group work on the current situation in the areas FWE – Sustainability Perspectives

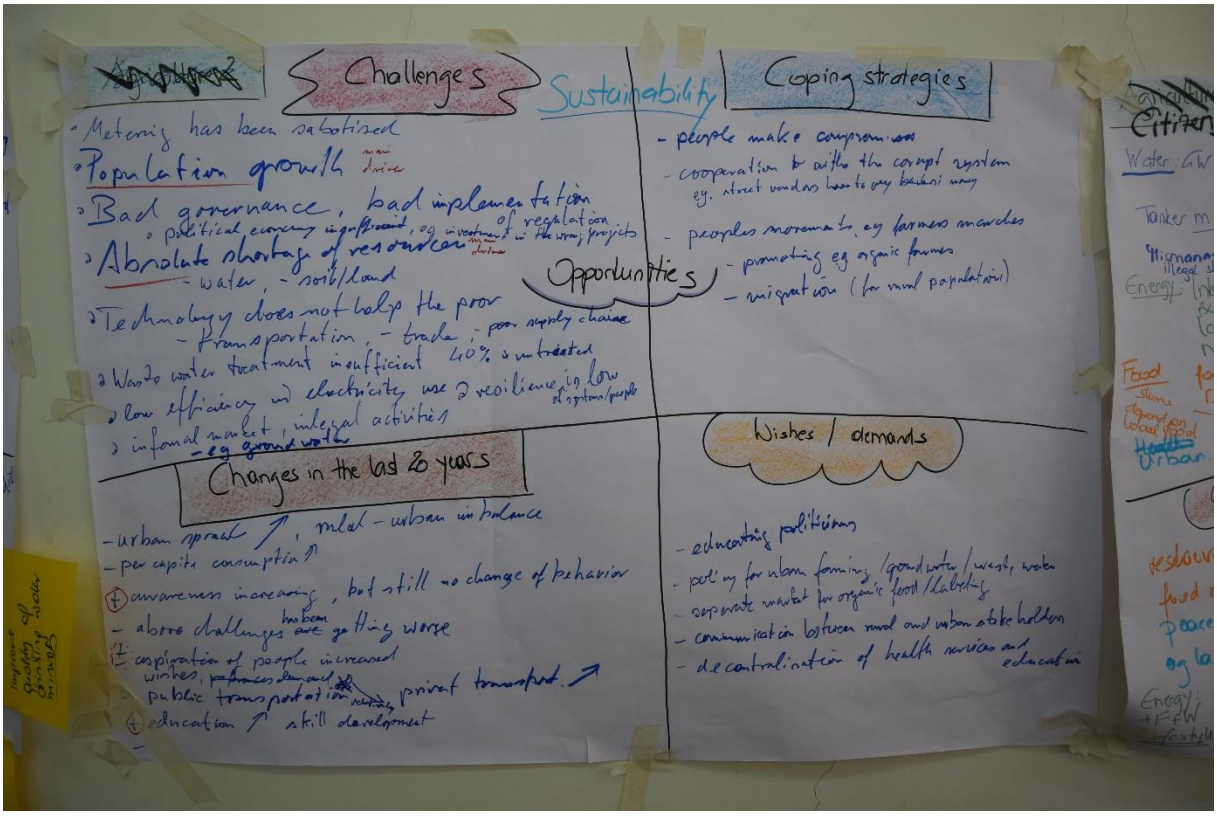
- Availability of organic food products limited in the city
- Migration: not necessarily negative, often seen one-sidedly

Opportunities

- Small groups connecting farmers to urban consumers, improve market access
- People migrating from rural areas would have skills to do farming in city, but no policies → but would it contribute to urban water shortage?

Coping Strategies

- People cope by reduced consumption in times of scarcity
- Migration (partly only men, partly only season)
    - Corruption as coping strategy: e.g. street vendors pay four different people to put up store (only one authorized)
- Political action, e.g. farmer's marches → increased awareness among urban residents for farmers' problems
- In traffic: flexibility: change commuting hours, work from home, ride sharing
- Increased communication, periodic roundtables between urban and rural

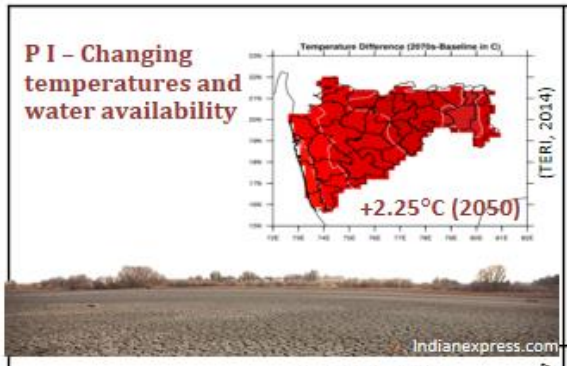
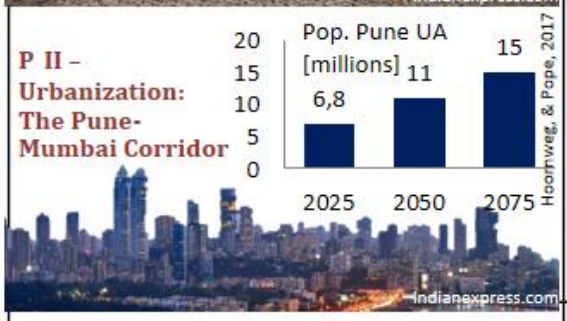


Back to Session Overview

Group Work: Looking into the future

See slides "3) FUSE_WS_Scenarios_18-20-Feb-2019"

Short summary of perspectives

	Climate simulations predict an increase in average temperature of more than 2°C across the state by 2050. The total annual precipitation is expected to increase slightly, but with likely regional, interannual and seasonal variation. For crops such as rice or sorghum, this may imply decreasing yields. New water allocation conflicts and a further widening of the socio-economic urban-rural and intra-rural disparities are expected.
	The Pune urban agglomeration (UA) has been growing rapidly over the last decades and no end to the population and spatial growth is in sight. The growth of the city entails an increased and more concentrated use of resources like water, and a loss of fertile land at the city's margins. Especially the expressway to Mumbai will attract settlements, forming an urban corridor between the two metropolises.
	Maharashtra is experiencing an industrialization of agriculture: Large-scale, high-intensity, water-demanding agriculture (cash crops, e.g., sugarcane) replace small-holder, subsistence farming. Solar farming might become an alternative to cash crops. Transformation also occurs as natural land is converted to agricultural. The transformation will entail further rural-urban migration.
	Maharashtra's electricity demand is expected to grow until 2030 by 110% and until 2050 by ca. 150%. Reasons are primarily population growth, higher living standards and changing agricultural practices involving energy-intensive water pumping. Renewables have high potential but large investments would be required to keep pace with the growing demand. Poor people may increasingly face energy poverty due to rising prices.

Looking into the future: group work on future perspectives

See presentation ".) FUSE_SH-WS_ModerationSlides_18-Feb-2019" – #6-7

Task given by FUSE Team:

Group work on different future perspectives

Mixed groups

- 4 different perspectives of possible future situations
- How would different people react to this situation
- What would you change
- How would you cope with challenges
- How would you use new opportunities
- What would you do to sustain or reach a good live for them and their families
- What would you need?

Back to Session Overview

Water Scarcity

Additional material for this session:

- ***Audio:*** ***3a) Presentation Scenario Water Scarcity_Pune SH-WS – 00:11:00***
- ***Posters:*** ***3a) Water Scarcity Mindmap_Pune SH-WS***

Title of session: Presentation of scenarios and synthesis discussion

- **Minutes keeper:**

➢ **Second Group Work: Climate Change and Water Scarcity**

Water behaviour changes

New jobs

We have to think what are the scale we have to start planning. In our agriculture import and export policy we have to see we are not exporting those which requires more water, but export the crops which require less water. Present development policies, lifestyle and consumption are causing climate change we have to change those policies.

We have to conserve the water by using community participation,

Summer water is the most expensive because of the evaporation loss, these causes scarcity. Industry and agriculture are all part of one ecosystem and economic cycle.

Energy is most responsible for the climate change, how do we become wiser in the use of energy, in the sourcing of the energy.

Economic growth cannot be sustained for too long, we have to understand and make this in out practices and policies.

We have to change the definition of GDP and make it more inclusive of the externalities.

We need to do changes in the policy level to make farmers shift to other crops other than sugarcane. If in drip irrigation water saving is about 50% but in natural farming water saving is about 90%.

Change the lifestyle and water uses pattern in agriculture, industries, urban sectors and residential sector.

Water budgeting in consultation with the community. // Water saving techniques for different sectors. // Awareness creation about the water uses and conservation.

The water stress will cause water supply disparity for the 35 to 45 % of population living in the slums. This will have impact on the health and nutrition, coping capabilities of the poor. It will have impact on the female gender as they are responsible for fulfilling the water demand for all of their family. Girl child are taken out of schools to fetch water from the standposts in slums.

Slum dwellers are paying 300 times more for the water compared to middle and higher income class getting municipal water. Presently middle and higher income group get 400 to 500 litter per capita per day (lpcd). Whereas, in slums they don't even gets 100 lpcd. This also cause water and sanitation linked health impacts.

Water tanker and water jar supply will increase.

Energy behaviour/sources; Skills demanded *Back to Session Overview*

Urbanization

Additional material for this session:

- ***Audio:*** ***3b) Presentation Scenario Urbanization_Pune SH-WS – 00:08:02***
- ***Poster:*** ***3b) Urbanization Mindmap_Pune SH-WS***

Title of the session: Presentation of scenarios and synthesis discussion

- **Time: 15:00 (?)**
- **Minutes keeper:**

➢ **Urbanization Scenario**

Which were the most intensively discussed topics? Where was a consensus achieved and where dissent? Please describe a consensus resp. open points.

- If agriculture is lost, maybe the people have money but where will the food come from?
- Scenario is horrifying, very frightening: tremendous resource use
- South Asia development needs to be looked at together, consider Maharshtra's embeddedness. Eg. Current food crisis in Bangladesh lead to migration to India
- Farmers are worried because next generation will not want to live in rural areas, don't want to do farming anymore: farming is not stable anymore, women don't want to marry farmers
- Food quality also in rural areas is worsening → less nutritious, young farmers have less energy than older ones. Cancer and other diseases increasing
- More greenhouses, intesnive, small-scale agriculture may be a solution, e.g. vertical or rooftop farming
- Agricultural land should not be allowed to be transformed into urban land
- Loss of natural land will trigger further environemntal and socio-economc issues, e.g. reduction in honey bees
- Slums: no large-scale physical expansion of slums expected (land availability, owenrs are stricter, land very valuable). Exception: uphill slum growth

Slums

- Slum density will increase, 3-4 stories! → in Dharavi (Mumbai) this is already happening
- Water will still be provided in slums, even in case of densification
- Generally, living spaces in cities are decreasing (in Mumbai this is already further)
- Extreme events as drivers for slum growth: 1972 (drought) Punes slum population doubles in one year.
- Slum residents that are offered new housing further outside the city don't move there but rent them. Bc of income sources they stay in more central pockets
- Migrants will enter service economy, stay close to higher-income neighborhoods → jobs in household service

Looking into the future: group work on future perspectives – Urbanization

Townships

- Townships in peri-urban area allow more eco practices, small scale farming, decentral RE…
- Townships sprouting everywhere around Pune, some also for 2nd home, for which the Mah. Government has reduced tax
- People prefer to travel farther, live in townships and work in centre
- Farmers who sell their land to townships get jobs there as gardeners etc. and also continue produce within townships (for sale inside and outside township)
- Township produces electricity from biogas, used e.g. to light street lights

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Land transformation

Additional material for this session:

- ***Audio: 3c) Presentation Scenario land transformation_Pune SH-WS – 00:08:40***
- ***Poster: 3c) Land transformation Mindmap_Pune SH-WS***

Title of the session: Scenarios discussion and presentation: Land transformation in rural areas

- ***Time: 15:00 (?)***
- ***Minutes keeper:***

➢ **Short description of the topic, setting and agenda of the session**

The aim of this session was to discuss possible reactions to the given perspective concerning coping mechanisms, but also solutions that are needed/suggested in order to still have a good life.

➢ **Summary of the scenarios (main points, indicate names per group, but minutes without names)**

Agriculture will be much more industrialized, focussing on cash crops such as sugar cane, high intensity agriculture or solar farms. This might lead to further demand of water, thus GW depleting goes and energy demand for pumping is increased. More bioenergy plants are grown and less food is produced locally. The small (subsistence) farms are given up, migration to cities is strong. Other farmers might go to natural areas and transform them into farmland.

➢ **Which were the most intensively discussed topics? Where was a consensus achieved and where dissent? Please describe a consensus resp. open points.**

The participants of this group were mainly farmers. They said, they would react in different ways, it is context dependent and cannot be generalised. Some might give up their land and move to the cities, some might sell it to ag industry and keep a bit for subsistence farming and stay on the land, doing something else, such as managing the farm or work in a solar farm there, some might specialise on vegetables for the local population….

Skills for high-tech ag are needed or for any other jobs in rural areas; social structures need to be adapted.

The following solutions were suggested:

- Appropriate knowledge about farming (innovative farming, high-tech, organic…), allowing young generation to earn enough money to stay in the rural area
- The existing ag business needs to be supported
- Tools, techniques need to be provided for free or cheap to farmers
- Certification processes need to be supported
- Subsidies for small scale farmers are needed and should directly reach the beneficiaries
- Real farmer-oriented policies are needed that allow farmers to stay (education, access to infrastructure, marketing and appreciation of their work, subsidies, miminal prices for some crops (vegatables)…)
- Government needs to increase trust in them
- Support of group farming, as well as crop variety
- Help farmers with their marketing

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Energy Demand

Additional material for this session:

- ***Audios:*** ***3d) Discussion Energy Demand_Pune SH-WS – 00:51:33***
  3d) Presentation Energy Demand_Pune SH-WS – 00:08:27
- ***Poster:*** ***3d) Energy Demand Mindmap_Pune SH-WS***

Title of the session: Presentation of scenarios

- ***Time: 15:35 – 16:30***
- ***Minutes keeper:***

Participants:

- ***Ravindra Sinha, Harshil R., Mayur Sarode, Mahesh Sudhaker Siddheshwar***

➢ **Short description of the topic, setting and agenda of the session**

- P4 - Electricity demand increase and insecurity
- 1 table with 4 participants, host:
- Agenda: group discussion on scenario: P4 - Electricity demand increase and insecurity

➢ **Summary of the scenarios (main points, indicate names per group, but minutes without names)**

Main points of scenario:

- Reasonable assumption – electricity demand will increase: life style change (e.g. ACs in new buildings, more household electrical devices, e-vehicles); (energy intensive-) IT industry in Pune; growth in population
- Electricity price will increase while people's income will also increase – affordability is not the main issue
- Decrease in electricity consumption will probably not happen, while advanced technology and more renewable energy sources will be developed (e.g. solar PV, wind energy, biomass)
- Conventional energy sources will remain (with even increasing capacity), while solar PV and biomass hold the most potential in sustainable energy sources

➢ **Which were the most intensively discussed topics? Where was a consensus achieved and where dissent? Please describe a consensus resp. open points.**

Most intensively discussed topics:

- Innovative technologies
- Renewable energies

Consensus:

- New technologies need to be developed, e.g. electricity-saving devices, grids preventing electricity loss
- Adoption of advanced energy-related technology from other countries
- More researches on sustainable energy management and innovative energy-related technologies need to be conducted

Looking into the future: group work on future perspectives – Land Transformation

- More attention should be paid on eco-friendly material and construction
- Renewable energy in innovative generation forms: floating solar PV on rivers; implementation of decentralized biomass production devices, which would not cause conflicts with agriculture land use
- Development of smart grid, including e.g. compensated price for commercial electricity use when the employees contribute solar energy into network from their private houses
- Development as well as efficient implementation of renewable energy policies
- Efficient public transport planning and maintenance are needed
- Electricity theft should be better monitored by distribution company
- More water will be pumped for irrigation

➢ **Summary of main content and description of key findings/insights**

Summary:

The P4 scenario is a convincible scenario according to current observations of energy consumption trends. Technology revolution and renewable energies are the two key solutions towards this scenario.

Key findings:

- Energy behaviour:
  - Increasing demand due to lifestyle changes (more electrical devices)
  - Increasing acceptance / use of energy-efficient technologies
  - Use of advanced batteries
  - Other (private) energy sources (e.g. roof top solar PV)
  - E-mobility
- Energy – sources:
  - Conventional energy sources remain
  - Increasing of renewable energy use (e.g. roof top solar PV, solar farm, wind)
  - Floating solar panels on reservoirs
  - Decentralized bioenergy use and use of uncultivated land for biomass production
- Frame conditions needed:
  - Well-managed public transport system
  - Smart grid
- What will they eat:
  - Decreased availability of biomass for fodder
- Skills required:
  - High quality solar PV installations
  - Convert heat from industries into power
  - Eco-friendly materials and constructions
  - Development of energy storage solutions
- Water issues:
  - Water pumps powered by biofuel
  - More water will be consumed, water pumping will increase

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Outlook and Check-Out

Additional material for this session:

- ***Audios:*** ***4) Final Discussion_Pune SH-WS – 00:18:57***
- ***Posters:*** ***4) TakeAways_Pune SH-WS***
- ***Slides:*** ***.) FUSE_SH-WS_ModerationSlides_18-Feb-2019 – #8-9***

Title of the session: Outlook and Check-Out

- ***Time: 17:30 – 17:50***
- ***Minutes keeper:***

➢ **Short description of the topic, setting and agenda of the session**

- Main take-away of FUSE team & participants
- 5 tables with 25 participants
- Agenda:
  - FUSE take-away
  - check-out round

➢ **Outlook – take-away of FUSE team**

- BK: This is our first workshop in the project, and we are looking at future development. The objective is to find possible policy implementation and decentralized individual solutions to FWE challenges.
- IO: The project team will discuss today's result / your inputs tomorrow, and translate them into some input for our Wednesday expert workshop.
- CK: We will construct a model to simulate biophysical development as well as human behaviours. It would not be possible to include every perspective, however, the model will help us evaluate policy interventions under different scenarios. We will come back with our model results and evaluations, and exchange with you in one and half year.
- Participants:
  - We need to keep in touch in order to get back together for the second workshop
  - Solution-based ideas should be communicated, local-based ideas need to be exchanged
  - Create Facebook page and share the link

➢ **Check-out round (clustered answers, without names)**

Amazing	Wonderful	Networking	Excellent	Energy x4
Future	Sharing	Resourceful	Policy and future	Knowledge
Hope	Transition	Wisdom	Cooperation	Opportunity
Insights	Cooperation exploration	Vision	New perspective	New direction
More challenges	Positive hope	Landing	Information	Thank you

Workshop Transfer Day Pune

19 February 2019

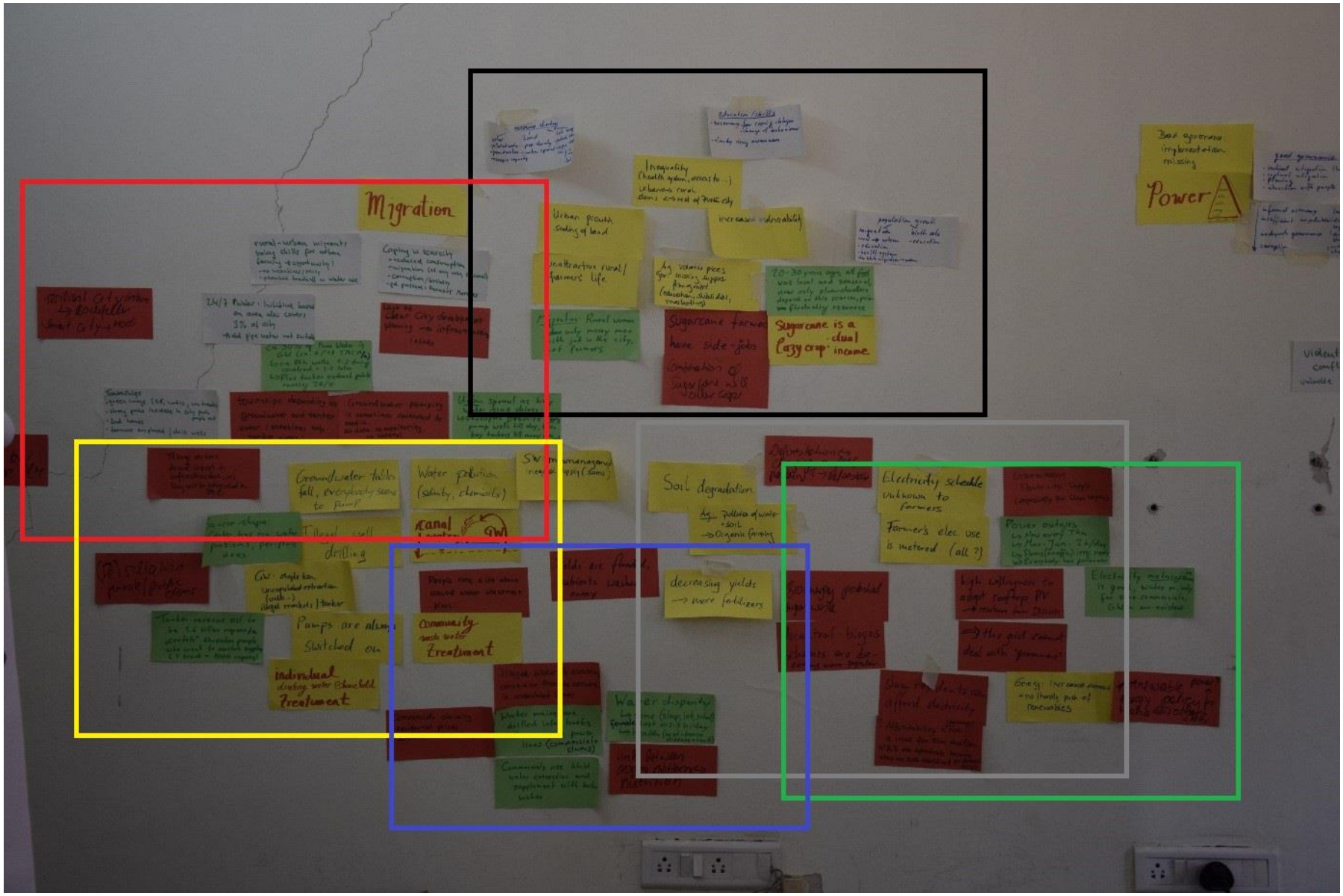
The Transfer Day (TD) took place between the Resource User Workshop and the Expert Workshop on 19 February. Its goal was to harvest and collect the results of the SH WS and then to be able to present a condensed version of these results to the experts and stimulate discussion.

After some discussion, how this could be done best, the team agreed on the following procedure: First, everyone recalled the previous day by taking another look at all the posters and flipcharts. Within half an hour, each team member noted the aspects they considered relevant results, be it in terms of new information, challenges, coping strategies and so on. In a second step, thoughts were shared and challenges were put down on cards and clustered. In this protocol you find a photo of this task showing all the clustered cards. It is followed by a second picture, which is divided by colored frames. Below these two pictures, you will find a table containing the typed cards clustered according to types of challenges. This was done after the workshop based on the available pictures. In Pune, the team proceeded by condensing their results and transferring them to the FWE-Urban-Triangle. Thereby, a presentable visualization was reached, which was used the next day at the Expert Workshop. You can find pictures and the digital result below and again in BOX.

TRANSFER Clustered Cards – Overview

1a) Clustered Card Overview_Pune TD

TRANSFER Clustered Cards – Frames



1a) Clustered Card Frames_Pune TD

TRANSFER Table – Clustered Cards

Challenge	Nexus Dimensions	Actors	Card
CROSS CUTTING ISSUES			
Education	all		education/skills --> necessary for coping strategies; changes of behaviour --> already rising awareness
Inequality	all		Inequality (health system, access to…) --> urban-rural; slums-rest of Pune city
Vulnerability	?		increased vulnerability
POWER	all		power
Informal economy and Bad Governance	all	government	informal economy (no regulation); insufficient implementation (disfunctional regulation); inadequate governance (disfunctional structures); corruption (undermine structures) --> good governance: vertical integration; sectoral integration, planning, interaction with people
Bad Governance	all	government	Bad governance: implementation missing
?			Resilient City' --> Rockefeller; 'Smart City' --> Modi
Resource Shortage	all		resource shortage --> water (polluted water; groundwater; reservoir capacity); land (population density; urban spread); soil [?]; land [?]
Scarcity	all		coping with scarcity --> reduced consumption; migration (only mean, seasonal); corruption/bribery; political pressure: Framers' Marches
INCREASINGLY DIFFICULT CONDITIONS IN AGRICULTURE			
Soil degradation	food		Soil degradation
Deforestation			Deforestation-changing rainfall patterns?- Reforestation
Pollution of water and soil	food, water		Pollution of water and soil --> organic farming
Flooded fields	food		fields are flooded, nutrients washed away
Decreasing yields	food		decreasing yields --> more fertilizers

local food	food	slum-dwellers	20-30 years ago, all food was local and seasonal, now only slum-dwellers depend on this scarcer, price-fluctuating resource
Missing gov. support in agriculture	food	government	volatile prices in Agriculture --> missing support from government (education, subsidies, marketing)
CROPS			
Nutrition	food		link between croping patterns-nutrition
Sugarcane	food	sugarcane farmers	sugarcane farmers have side-jobs; combination of sugarcane with other crops
Sugarcane	food		sugarcane is a lazy crop: dual income
FARMERS AND ELECTRICITY			
Electricity schedule unknown to farmers	energy, food	farmers	Electricity schedule unknown to farmers
?	energy, food		farmer's electricity use is metered (all?)
MIGRATION RURAL → URBAN			
Unattractive rural life	food, urban	farmers	unattractive rural/farmers' life
Urban growth	food, urban	farmers	urban growth/sealing of land
Urban Migration	food, urban	rural women	Migration: rural women only marry men with jobs in the city not farmers
Population growth; urban migration	urban		population growth --> through rural to urban migration (education, health system, inter state migration) // through birth rate (education)
WATER CHALLENGES			
Siltation of dams	water		(De)siltation of private/public dams
Groundwater depletion	water		groundwater tables fall, everybody seems to pump
Water pollution	water		water pollution (salinity, chemicals)
illegal well drilling	water		illegal well drilling
GW depletion and illegal markets/tankers	water	tanker	GW depletion: unregulated extraction (wells), illegal markets/tanker

Water disparity	water	women	Water disparity --> (female) time lost- 2-3h/day; health (water borne disease and sanitation)
ELECTRICITY CHALLENGES			
Bioenergy potential	energy, food		bioenergy potential (sugar waste)
Biogas	energy		decentral biogas schemes are becoming more popular
resistance to rooftop PV	energy	DISCOM	high willingness to adopt rooftop PV --> resistance from DISCOM --> the grid cannot deal with 'prosumers'
Missing RE policy	energy	government	Energy increased demand + no/hardly push for renewables; missing renewable energy policy
URBAN WATER CHALLENGES			
Water disparity	water, urban		saucer [?] shape: Center has no water problems, peripherie does
Pumps	water		pumps are always switched on
tanker 'cartels'	water, urban	tanker	Tanker revenues estimated to be 1.6 billion rupees/a 'cartels' threaten people who want to switch suppliers (1 truck = 1000 rupees)
Wastewater treatment	water, urban		people care a lot about waste water treatment plans
Wastewater treatment	water, urban	community	community waste water treatment
Wastewater treatment	water, urban	households	individual drinking water treatment at households
Urban Sprawl	urban, water		Urban sprawl as key water issue driver: --> Developers promise supply, pump wells till dry, the buy tankers till money runs out
24/7 water	water, urban		24/7 Water: Initiative based on area [?] covers 3% of city --> old pipe network not suitable
urban water supply	water, urban		ca. 30% of Pune Water is GW (ca. 6/18 TMCM/a) --> ca. 80k wells: 1-2 during construct. + 1-2 later; plus tanker extracting points running 24/7
urban migration	urban, water	migrants	rural-urban migrants bring skills for urban farming --> opportunity? --> no incentives/policy; potential tradeoff with water use
Commercials and water prices	water, urban	commercials	commercials claiming residential (water) prices, because that's cheaper

Commercials use household w. connection	water, urban	commercials	commercials use household water connection and supplement with tanker water
Water theaft (?)	water, urban	commercials, slums	water metering[?] are drilled info, hooks thrown onto power lines (commercial and slums)
URBAN ELECTRICITY CHALLENGES			
intermittent electricity supply	energy, urban	slum-dwellers	intermittent electricity supply (especially for slum areas)
power outages	energy, urban	citizens	power outages (now every thursady; mar-jun: 2h/day; slums (unoffic.): irregular supply --> everybody has generator)
?	energy	slum-dwellers	slum residents can afford electricity --> affordability is perhaps not an issue for slum-dwellers. W&E are affordable because they are both subsidized for domestic sector
URBAN WATER AND ELECTRICITY CHALLENGES			
Metering	energy, water, urban		Electricity metering in Pune is good; water m. only for come commercials, GW m. non-existent
Illegal water and electricity in slums	energy, water, urban	slum-dwellers	illegal water & electricity connection from the network in undeclared slums
TOWNSHIPS			
Townships image vs. Effects	urban, water		Townships: green image (RE, [?], ww treatment); strong price increase in Pune city pushes people out; 2nd homes; farmers employed/drill wells
Townships and water	urban, water		Townships depending on groundwater and tanker water (sometimes only tanker water); groundwater pumping is sometimes controlled by mafia. Not data, no monitoring, no control
CITY PLANNING			
Investment in infrastructure	urban	fringe area	fringe areas do not invest in infratsructure, as they will be integrated in PMC
City development planning	urban		lack of clear city development planning --> infrastructure issues

TRANSFER. Suggested Responses (First compilation)

PMC 24 x 7 Plan

- Reduce non-revenue water
- Achieve piped water supply target of150 LPCD
- Increase ground and elevated storage (tanks)
- Meter and charge for water-use

Enhanced Water supply

- Harvest rainwater
- More water from ag to urban (maybe to enable PMC24x7)
- Encourage solar farming (by reduction in electricity subsidy)
- Increase irrigation efficiency
- Use wastewater for irrigation (v2)
- Achieve equal water distribution (maybe with PMC24x7)

Water Demand management

- Prioritize away from sugarcane (lower subsidy)
- Reduce electricity subsidy (lower cost factor)
- Raise price of municipal water (shift the supply curve)
- Achieve equal water distribution
- Allocate water
    - (urban/irrig. decision makers and agents)
    - (system wide return flows)

Future Energy Management

- Encourage solar farming
    - Subsidy and capacity cap to plug to grid
    - For GW pump at farms
- Enable bio-ethanol from sugarcane
    - Increase subsidy to achieve blending target
- Encourage Wind energy

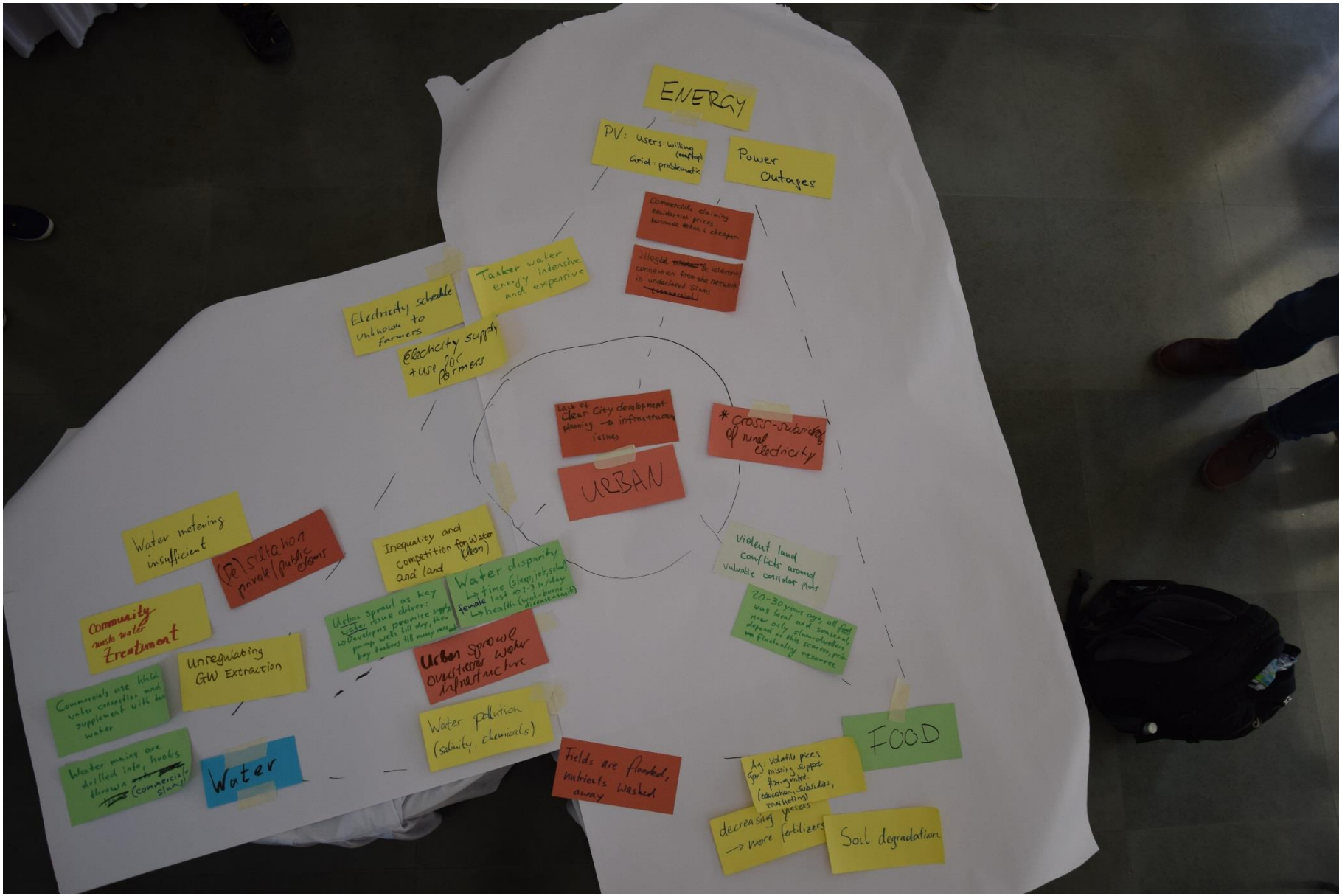
Agriculture and land use management

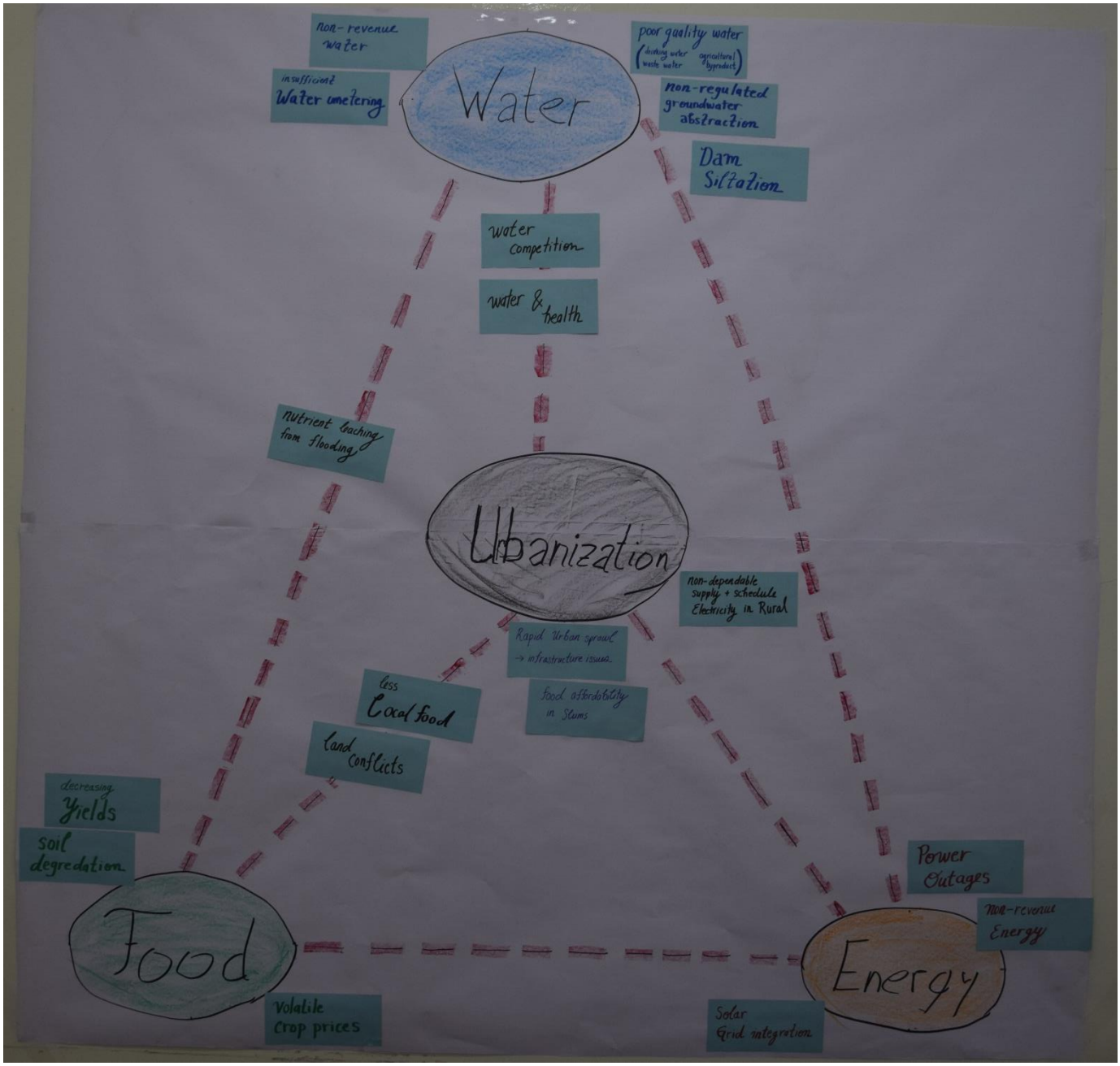
- Organic Agriculture Support
- Crop Diversity
- Limit Urban Sprawl (City Development Plans)

Extreme Events Management

- Flood, e.g. reservoir rule changes
- Drought
- Heat wave

TRANSFER Challenges Triangle




Water
non-revenue water
insufficient Water metering
poor quality water
(drinking water waste water agricultural byproduct)
non-regulated groundwater abstraction
Dam Siltation
water competition
water & health
Urbanization
nutrient leaching from flooding
non-dependable supply + schedule Electricity in Rural
Rapid Urban sprawl → infrastructure issues
food affordability in Slums
less Local food
land conflicts
decreasing Yields
soil degredation
Power Outages
non-revenue Energy
Food
Energy
Volatile Crop prices
Solar Grid integration

Expert Workshop Pune, 20 February 2019

The minutes you find below were taken during the Expert Workshop in Pune on 20 February by FUSE Team members or (in rare cases) by local support staff. The minutes are categorized according to the agenda and numbered consecutively. On the next page, you will see the agenda followed by an overview of sessions and related materials. The overview includes links that allow you to directly jump to the section you are interested in. In the case that a session involved group work, you may again find links, which lead you to each group. The given group task is mentioned at the beginning of these sessions. At the end of each section, you can go back to the overview by clicking on "back to session overview". The overview provides also information about material, which was collected in addition to the minutes, i.e. audios, posters, and slides. To simplify your navigation through the document and make it easier to find the information you are looking for, here is a short summary of the expert workshop's content and of the kind of information, you can expect to find:

A short welcome and getting to know each other was followed by a presentation/key note about the FUSE project by Steven Gorelick and Christian Klassert including a Q&A for participants. (Presentation slides and audio of Q&A in BOX, short minutes below). Then the condensed results of Stakeholder Workshop (SH WS) were presented. You can find an illustrative visualization below and on BOX. To learn more about the transfer process of results, which took place between the workshops, please refer to the minutes and material of the Transfer Day. With the results of the SH WS in mind, the participants were then asked to form groups and dream about "The Future they want". They should imagine the year 2050. All challenges, of which they just have heard about, have been overcome. Actors from academia, government, NGOs, civil society have worked together to develop a sustainable Upper Bhima Basin and Pune city. The group task was to discuss the essentials of such a future with respect to FWE. The minutes taken represent a summary of these visions. In BOX you will further find nice drawings of these visions. The audio files – about four minutes each – are records of the final presentations to the other groups. For these presentations no minutes were taken.

In the afternoon, Raphael Karutz presented four different perspectives on future developments within SSP2 (same as for the SH WS: water scarcity, urbanization, transformation of agriculture, energy demand). A short summary of these perspectives is included below (additional material: presentation slides). Subsequently, participants discussed in four groups – each taking a different perspective as a starting point – how their visions of a sustainable future (formulated in the morning session) could be reached, even though FWE systems are put under pressure in the perspectives. The minutes cover these discussions. The following presentation of group work results is again documented on audio only. The day ended by a feedback round and presentation of next steps. Some impressions are noted down in the minutes. At the very end you find some notes of the team's reflection on the workshop. In

summer 2019, the team prepared a Documentation of the Stakeholder and Expert Workshops in Pune intended for participants and the public. Please refer also to this document for impressions and summarized facts, key points and outcomes. Further, refer also to the internal Stakeholder Workshop Documentation and the summary of the Transfer Day. The latter's goal was to gather and systematize the challenges expressed by participants of the SH WS to be able to present them to the experts.

Agenda Expert Workshop 20 February 2019, Pune

Time	AGENDA
09:00	Welcome and getting to know each other (1)
09:45	Introduction into the project and keynote (1)
10:30	Break
10:50	Presentation of results of the stakeholder workshop (1b)
11:15	Group work: The future we want (2)
12:15	Presentation of results (2 – audios)
13:00	Lunch break
13:45	Presentation of 4 scenarios (3)
14:30	Working groups on different scenarios (3)
16:00	Break
16:15	Presentation of scenarios (3 – audios)
17:15	Summary and next steps (4)
18:00	End of workshop

Overview: Sessions and Material

Session	Material
1) Welcome and getting to know each other // Introduction into the project	- Minutes: ***Check-in and intro to the project*** - Audios: ***1) ProjectIntroQ&A_Pune ExpWS*** – 00:12:47 - Slides: ***1) FUSE_ExpWS_MainSlides_20-Feb-2019***
1b) Presentations of results of the stakeholder workshop	- Slides: ***1b) FUSE_ExpWS_Triangle_condensed-SH-WS-results***
2) Group work: The future we want	- Slides: ***.) FUSE_ExpWS_ModerationSlides_20-Feb-2019*** – #3-5
2a) Group 1_Host:	- Minutes: ***The Future we want*** – - Audios: ***2a) Presentation Vision Group 1_Pune ExpWS*** – 00:04:07 - Posters: ***2a) Vision Group1_Christian_Pune ExpWS***
2b) Group 2_Host:	- Minutes: ***The Future we want*** – - Audios: ***2b) Presentation Vision Group 2_Pune ExpWS*** – 00:04:04 - Posters: ***2b) Vision Group2_Heinrich_Pune ExpWS***
2c) Group 3_Host:	- Minutes: ***The Future we want*** – - Audios: ***2c) Presentation Vision Group 3_Pune ExpWS*** – 00:04:00 - Posters: ***2c) Brainstorm Vision Group3_Bernd_Pune ExpWS*** ***2c) Vision Group3_Bernd_Pune ExpWS***
2d) Group 4_Host:	- Minutes: ***The Future we want*** – - Audios: ***2d) Presentation Vision Group 4_Pune ExpWS*** - 00:03:35 - Posters: ***2d) Vision Group4_Karin_Pune ExpWS***
2e) Group 5_Host: Avinash	- Minutes: ***The Future we want*** – - Audios: ***2e) Presentation Vision Group 5*** – 00:04:07 - Posters: ***2e) KeyValue Group5_Avinash_Pune ExpWS*** ***2e) Vision Group5_Avinash_Pune ExpWS***
2f) Common Vision	- Audio: ***2f) Common Vision_Pune ExpWS***

3) Presentation of 4 scenarios // Working groups on different scenarios	- Minutes: ***Short summary of Perspectives presented*** – - Slides: ***3) FUSE_WS_Scenarios_18-20-Feb-2019***
3a) Water Scarcity	- Minutes: **Discussion on policies** – , - Audios: ***3a) Presentation Scenario Water Scarcity_Pune ExpWS*** – 00:12:18 - Posters: ***3a) Water Scarcity 1_Pune ExpWS*** ***3a) Water Scarcity 1_Pune ExpWS*** ***3a) Water Scarcity Summary_Pune ExpWS***
3b) Urbanization	- Minutes: ***Scenario Session Urban*** – - Audios: ***3b) Presentation Scenario Urbanization_Pune ExpWS*** – 00:15:22
3c) Land Transformation	- Minutes: ***Scenario Rural Transformation*** – - Audios: ***3c) Presentation Scenario land transformation_Pune ExpWS*** – 00:08:40
3d) Energy Demand	- Minutes: ***Discussion on policies*** – , - Audios: ***3d) Presentation Energy Demand_Pune ExpWS*** – 00:04:25
4) Discussion, Synthesis, Next Steps	- Minutes: ***Outlook and Check-out*** – - Audios: ***4) CheckOut*** – 00:13:36 - Posters: ***4) TakeAways*** - Slides: ***.) FUSE_SH-WS_ModerationSlides_18-Feb-2019*** – #8-9
5) Reflections	- Notes: ***Reflections on Expert Workshop***

Welcome and getting to know each other // Introduction into the project and keynote

Additional material for this session:

- ***Audio: 1) ProjectIntroQ&A.m4a – 00:12:47***
- ***Slides: 1) FUSE_ExpWS_MainSlides_20-Feb-2019***

Title of the session: Check-in and intro to the project

- ***Time: 9:15 – 10:30***

➢ **Short description of the topic, setting and agenda of the session**

- Warming up exercises (motivation & introduction), FUSE project introduction
- 7 tables with 20 participants
- Agenda:
  - Check-in
  - Presentation of FUSE project and Q&A

➢ **Check-in answers (main points without names)**

- Interested in multi-disciplinary studies
- Exchange ideas for transferable solutions, efficient polices adapted to local situations
- Connecting different roles
- Interested in people's wish for the future
- Learn more about how to deal with water pollution and soil pollution, sustainable management for resources, spatial approach
- Discuss with people from different fields
- Learn more about FWE nexus concept and integrate it into Indian case

➢ **Questions and answers after input (main points, ideally clustered)**

- Pune is only one city, and could not represent the UBB, why Pune and UBB? -> UBB was chosen for hydrological basis. Pune holds a special position in Maharashtra (e.g. rapid urbanization, population growth, connection to Mumbai) and great potential in analysis from urban perspective. We will model the whole UBB (hydro-physically) at a detailed resolution scale and also study human behaviours in Pune. Besides, we are also doing research in Jordan. We would like to choose a city of similar size for further comparison. Rapid population growth in Pune -> an interesting pattern to look into for the future.
- Our focus is the long-term future, 50-100 years from now on. We will look into current challenges and possible coping strategies. However, current solutions might not be sufficient for the future, that's why we need a model covering all the aspects to be able to assess policy interventions under different scenarios. Our model is not only for one scenario, but for many possible combinations.
- Water use of urban population? Livestock? -> We will study household and commercial demand for water and energy. A detailed survey on household consumption will be conducted. All the resources users will be considered in the model, including water use of livestock.

- Impacts on different sectors will be analysed. Footprints and allocations might be included in the module as a matrix. Vulnerability and sustainability are distinguished.
- Biodiversity is also an important part. Any suggestions / advice on practical measures for biodiversity and ES are welcomed.
- We need to look at the past before looking into the future, and avoid mistakes in the past.
- ?An **integrated water assessment report in Maharashtra** was published last week (for groundwater, surface water, livestock water use, etc.) – Mr. Bhadane
    - ? Possibility 1: Master Plan for Integrated Development and Management of Water resources of Karli Sub-Basin, Water Resource Department, Government of Maharashtra. https://wrd.maharashtra.gov.in/portal/content/default/pdf/forms/ejalseva/7Karli6.pdf;jsessionid=pYQ+nvHqW1Vafl04Zg9M+g**
    - ? Possibility 2: Water Quality Status of Maharashtra 2017-18, (Compilation of Water Quality Data Recorded by MPCB), January 2019, Maharashtra Pollution Control Board. http://www.mpcb.gov.in/ereports/pdf/Water_Quality_Maharashtra_2017_18_report_07022019.pdf
    - ? Possibility 3: Maharashtra Water Resources Department – Vision 2020 report. https://wrdtest.maharashtra.gov.in/portal/content/default/pdf/events/Vision_2020_Website.pdf

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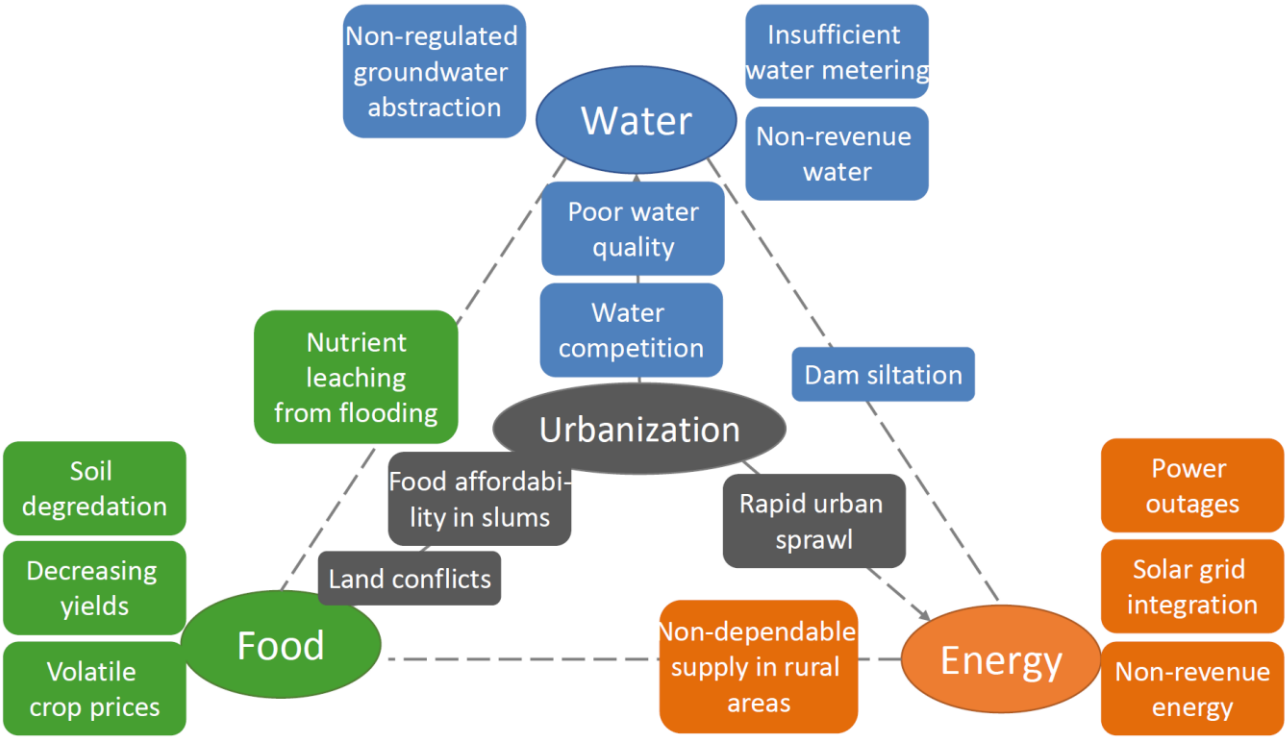
Presentations of results of the Stakeholder Workshop

1b) FUSE_ExpWS_Triangle_condensed-SH-WS-results

This graph is a condensed result of the Transfer Day and was presented during the Expert Workshop. Please refer to the Documentation of the Transfer Day to learn more about the process.



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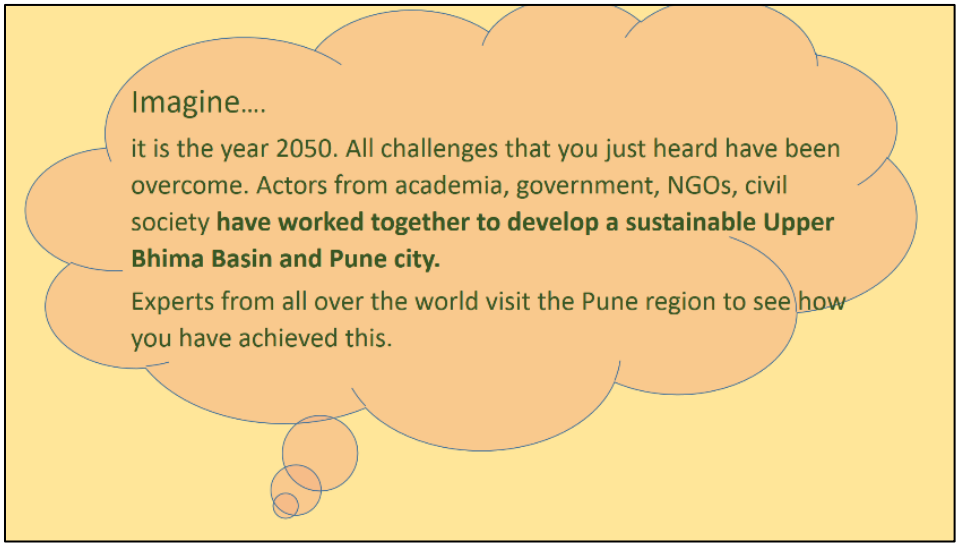
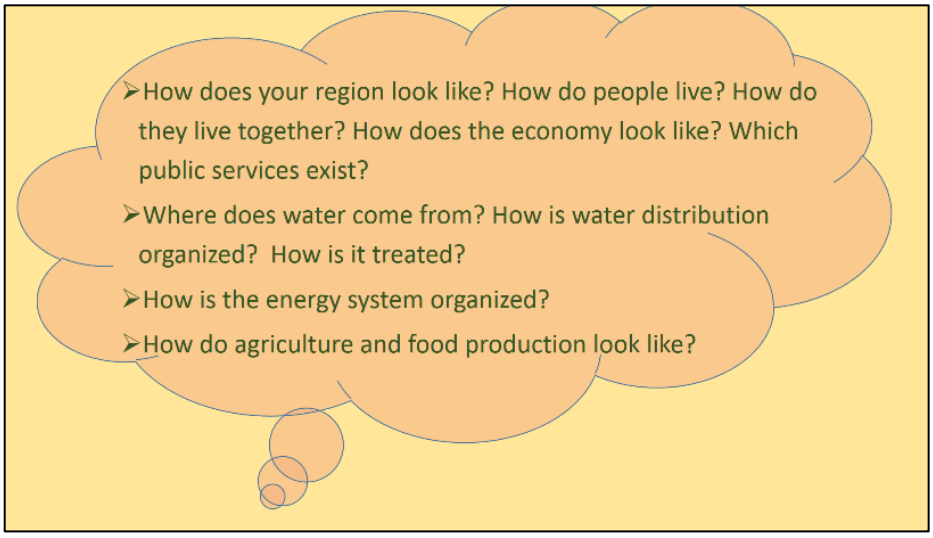
Group Work: The Future we want

See presentation ".) FUSE_ExpWS_ModerationSlides_20-Feb-2019" - #3-5

Task given by FUSE team:





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Group 1:

Additional material of this session:

- ***Audios:*** ***2a) Presentation Vision Group 1_Pune ExpWS – 00:04:07***
- ***Posters:*** ***2a) Vision Group1_Christian_Pune ExpWS***

Title of the session: The Future we want

- ***Time: 11:10***

General Socio-economic situation

- Stabilizied population growth
- Reorganized state's administrative divisions→according to basins (water central issue): would make management easier

Water

- All water users will be represented in water councils (instead of only irrigation)
- Water-saving technologies, recycling reduce water demand
- Integrated management of ground- and surface water
- Management levels: state: regulatory authorities, sub-basin level: development agency
- Good monitoring system
- **Equitable allocation** to every user → fair distribution
- Monetary incentives to water/energy saving
- Surface water will be main source (iin fringe areas, gw very limited
- Awareness and education among users are high
- **Rural households will have individual piped connections (instead of WUAs)**

Agriculture

- Crop breeding will bring drought-prone varieties
- Soil health (water holding capacity) is improved
- Agriculture will primarily provide food security and income
- Groundwater will not anymore be private property
- Food will be locally grown, direct sale in region, stable markets exist
- Growing crops on contaminated water will be banned (health hazard)
- 100% waste water will be treated
- All water supply will be metered, both commercial and household
- Group farming, industrialization of agriculture

Energy

- Solar energy will be dominant energy source
- **Floating solar** on reservoirs, wastelands, hilly areas
- Hydropower will continue and increase
- Wind farms will continued to be installed, also **hybrid systems** with wind
- Air cooled thermal power plants
- Assured cheap energy supply for urban and rural areas
- Number of vehicles reduced, public transport icnreased, more metro lines built

Urbanization

- Will be decenttralized, not focusid on the large cities
- Better iirrigation pull people to rural areas →slums will become smaller/not grow as fast, reversed migration
- Urban housing, relocation of slum residents

Economy

- Increase in industry
- Export of virtual water will be reduced (1kg of sugar currently 2500l water)

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Group 2

Additional material of this session:

- ***Audio: 2b) Presentation Vision Group 2_Pune ExpWS – 00:04:04***
- ***Poster: 2b) Vision Group2_Heinrich_Pune ExpWS***

Title of the session: Presentation and discussion of visions (future we want)

➢ **Short description of the topic, setting and agenda of the session**

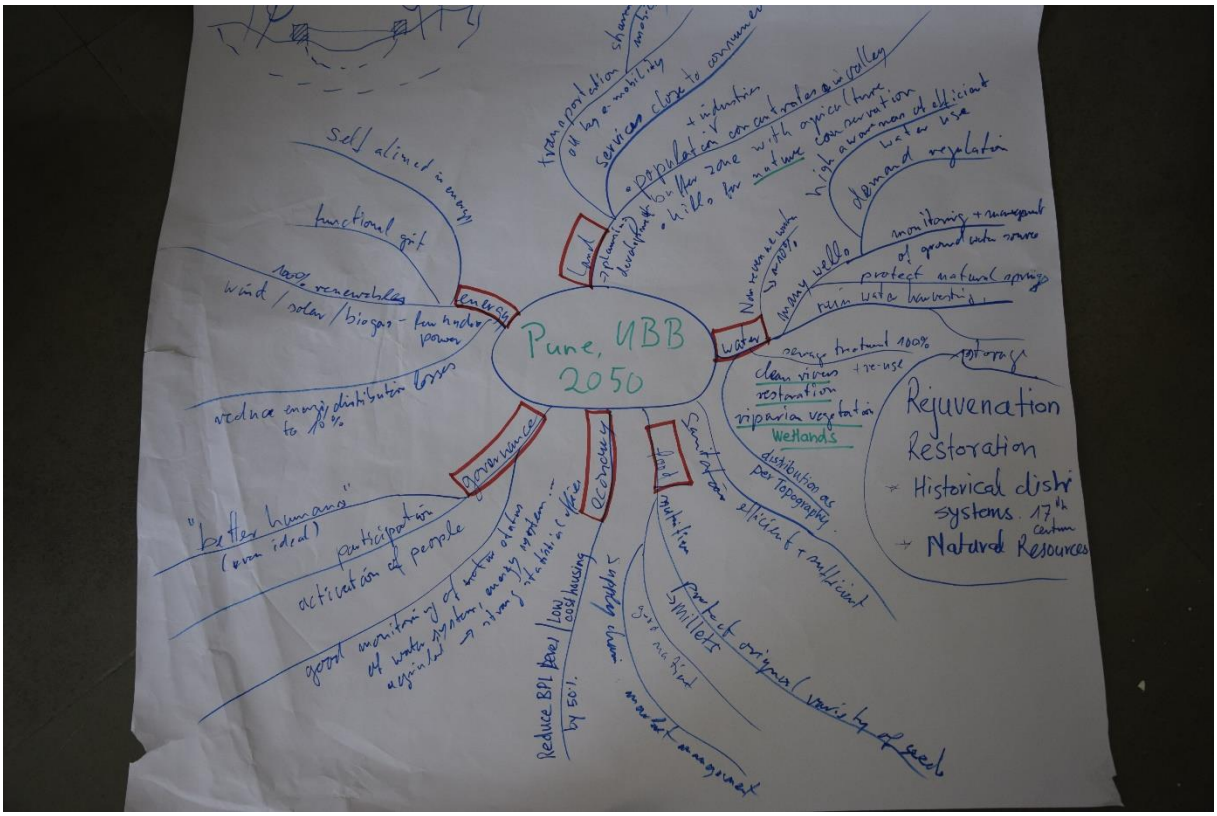
Vision exercise

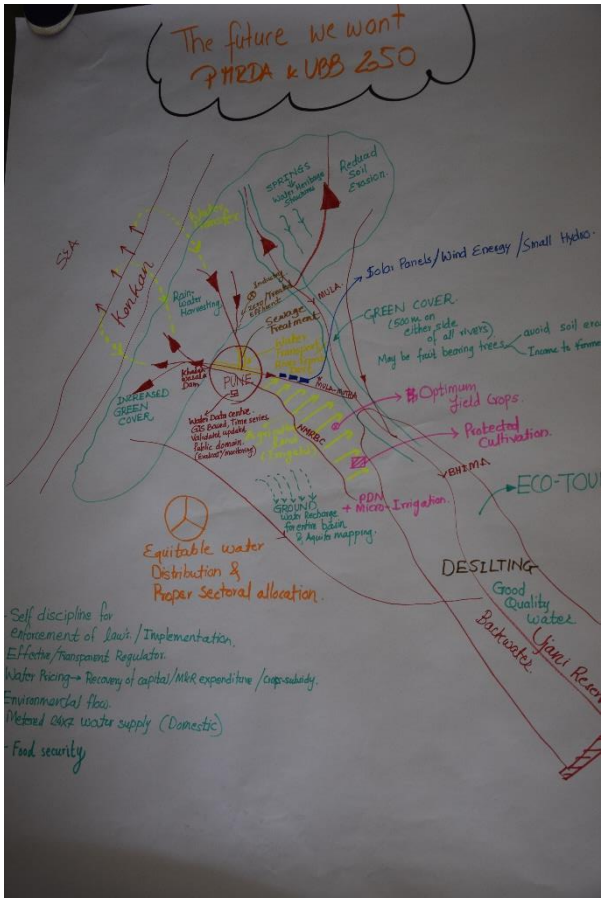
➢ **Summary of the visions (main points, indicate names per group, but minutes without names)**

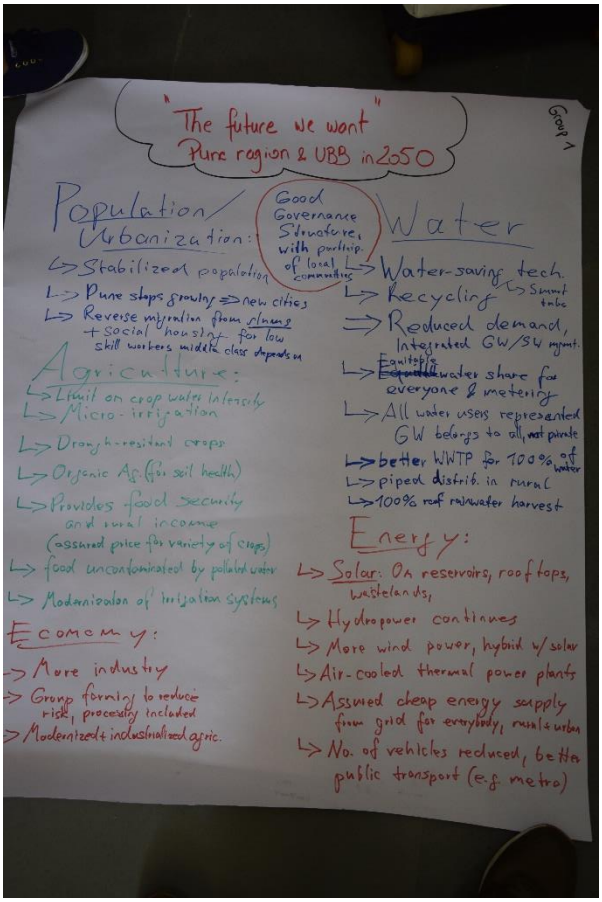
- Sustainable use of nexus resources
- No bias between rural and urban quality of life
- Reduction of inequality
- The city is green and clean
- There is responsibility towards other people and ecosystems
- Pune has vertical farms and green rooftops
- There is pervasive literacy
- In rural areas: use of renewables and micro-irrigation technologies, productivity is increased through better education, mechanization
- In urban areas: High share of people works in service industries, the dependency on agriculture for jobs is decreased
- Food is grown locally and consumed close to its origin
- Shift to less water-intensive crops, such as cereals
- No new dams are constructed, existing resources are used responsibly
- Wastewater is cleaned and reused
- Citizens are aware of water issues and adopt water-efficient technologies
- There is little silo thinking in governance, a systemic approach is adopted
- Farmers are independent from electricity suppliers through solar
- There is universal health care, in particular for pregnant women and small children
- Basic education in good quality is accessible to everyone
- Urban planning puts the human in the center, people live close to their jobs, necessity of travel is reduced, what is needed can be bought in a local market
- Public transport is all-available, runs on clean fuels (e.g. electricity from renewables)

➢ **Main discussion points (summary)**

- A discussion emerged with regard to the question whether health care should be provided privately or by the state, no consensus was reached







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Group 3

Additional material of this session:

- ***Audio:*** ***2c) Presentation Vision Group 3_Pune ExpWS – 00:04:00***
- ***Posters:*** ***2c) Brainstorm Vision Group3_Bernd_Pune ExpWS***
  2c) Vision Group3_Bernd_Pune ExpWS

Title of the session: Discussion of visions (future we want)

- ***Time: 11:10 – 13:00***

➢ **Short description of the topic, setting and agenda of the session**

➢ Discussion on a 'good and sustainable' future under current FWE challenges
➢ 1 table with 6 participants
➢ Agenda: group discussion on visions

➢ **Main discussion points (summary)**

- Water:
  - Increased use of rain water:
    - Rain water harvesting -> During the 4 months of monsoon, large amount of precipitation available (wells / groundwater can also be recharged during monsoon)
    - Rainwater storage devices at both community level and household level
  - Water management (SW&GW):
    - Recharge of surface water and groundwater
    - Data monitoring of both surface water and groundwater
    - Management of small-scale catchments
    - Measures to prevent over-extraction of groundwater
    - Restoration of rivers: clean non-channelized rivers -> Rivers in India are seasonal and dams affect negatively their capacity
    - Protection of natural springs – thousands of natural springs in Pune
  - Infrastructure:
    - Reconstruction and maintenance of ancient water distribution system, which exists in Pune since 17th centuries and is environmental friendly -> deliver water by gravity, without any power consumption
    - Reduction of non-revenue-water. In Pune city, around 35% water loss via distribution network per day. Average per capita daily water consumption doubles because of the water loss. -> less than 10% water loss in 2050
  - Water consumption behaviour:
    - Water recycling: reuse waste water for gardening, car washing, toilet flushing, etc.
    - High awareness of efficient water use as well as environmental friendly behaviour of people, who plays crucial role in directly affecting the resources and surroundings
      - Currently lack of related-(scientific) knowledge -> awareness raising is a big issue. Certain wells are now polluted, and become dumping grounds. Trash are threw directly into the wells.

    - Local resources are well-managed and pollutions are well-controlled, e.g. sewage system to be built (currently all polluted water is released directly into rivers)
    - At UBB scale, agriculture lands as buffer zones need to be restored for groundwater recharge.
    - Sanitation:
        - Efficient sanitation system with better flushing system
- Land/Urban:
    - More attention to land use, since land is also a limited resource and many competitions exist regarding land use
    - Relocation of industry sectors in rural areas
    - New peri-urban area needs to always be near mass public transportation
    - Transportation towards E-mobility (advanced technology to be developed)
    - Shared mobility (shared car, etc.)
- Energy:
    - More renewable energies (all kinds of RE: wind, solar, biomass, etc.), less fossil fuel
    - Functional grid
    - Decentralized energy supply system – self-sufficiency of energy (all kinds of RE) for households
    - Reduced electricity distribution loss. Currently 21% electricity distribution loss per day in average in Maharashtra -> reduce half of the loss – around 10% in 2050
- Governance:
    - Higher rate of participation for decision making
    - Clear policy on groundwater & energy for groundwater management. Currently groundwater is almost free.
    - Better implementation of policies and regulations, 'better' human behaviours
    - Less poor people in the future: now 40% of population below poverty line in Pune (1.8 dollars per capita per day)
- Food/Agriculture:
    - Change in crop pattern:
        - More rain-fed/irrigated crops cultivated -> irrigation water reduction
            - Policies in favour of rain-fed crops are necessary -> government should help develop market / supply chain for such rain-fed crops and water-saving crops, so that farmers are motivated for growing such types of crop. Farmers choose more cash crops now because of lack of profit.
        - Crops to be cultivated should be adapting
        - Traditional local crops such as millets remain
    - Equal irrigation water distribution (currently unequal)

➢ **Final vision description**

- Water:
    - Less NRW (<10%)
    - Rain water harvesting
    - Demand regulation
    - High awareness of efficient water use
    - Monitored and regulated GW

    - Natural springs protection
    - 100% sewage treatment
    - Rejuvenation and restoration (ancient water distribution system since 17th century, nature resources)
    - Reuse of waste water
    - Clean rivers and wetlands
    - Upstream area is responsible for clean water for downstream area
    - Distribution as per topography
    - Efficient and sufficient sanitation
- Land use and transportation:
    - E-mobility and shared mobility
    - Services close to consumers
    - Clear development plan
    - Necessary buffer zone between cities (e.g. agricultural land)
    - People and industries locate in valleys
    - Hills for nature conservation
- Energy:
    - Self-alimented energy supply
    - Functional grid and smart grid
    - 100% renewable energies (wind, solar, biomass, few nuclear)
    - Reduced energy distribution loss (to 10%)
- Governance:
    - 'Better human'
    - Participation
    - Good monitoring system
    - Harmonie among government, people and academia
- Economy:
    - Low cost housing
    - Reduced below-poverty-line level by 50%
- Food:
    - Better nutrition situation
    - Variety of cultivation
    - Supply chain
    - Market for water-saving crops

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Group 4

Additional material for this session:

- ***Audio:*** ***2d) Presentation Vision Group 4_Pune ExpWS – 00:03:35***
- ***Poster:*** ***2d) Vision Group4_Karin_Pune ExpWS***

Title of the session: Presentation and discussion of visions (future we want)

- **Short description of the topic, setting and agenda of the session**

The experts are guided to build an ideal future where all the conflicts from the user group, as well as all other ones that could be conceived of, have been resolved. Pune, along with the Upper Bhima basin is a global example of sustainable development.

- **Summary of the visions (main points, indicate names per group, but minutes without names)**

- Data is spatially and temporally dense, publicly available and validated by citizens.
- Solar energy and small hydropower projects are the main sources of energy.
- Clean water is available and provided to all.
- Equitable and reliable water and energy for all.
- Greening of the city and basin.

- **Main discussion points (summary)**

Discussions revolved mainly around water quality and availability, energy source and availability, and a sense of equitable distribution. The city was naturally designed to be clean and quiet, green, and with 24/7 water and energy. The basin was decided to be a place of ecotourism, with clean rivers and habitats along its stretch. Data access and generation were discussed at length, as well as transparency and validation of the data.

- **Final vision description**

- Potable water is delivered clean, and household RO (Reverse Osmosis) systems are no longer required.
- 24/7 water and electricity.
- Non-revenue water is reduced.
- Waste water is properly treated.
- Urban water consumption reduces to at most, 150 lppd.
- Urban water use is not necessarily free – it should be charged at cost, with potential subsidies to allow citizens to recognise the true value of the water and distribution network.
- River levels and flow as well as reservoirs levels and flow are measured at significantly many points and is available to the public. The collection of this data is transparent and can be validated by citizens. Data beyond this should also be widely available, including water allocations and consumption, and energy consumption.
- The upper reaches of the Bhima basin are lush with forest, and the basin becomes a location for eco-tourism. For example, the Ujjani basin is kept full beyond the minimum dead storage requirement, providing water for local ecosystem and bird migrations.

- The TATA dams currently privy to the significant water in the upper reach of the basin for electricity generation (and subsequently diverted out of the basin), are instead returned to the basin.
- Greening of the riverbank and riverside development work to beautify and clean the riverside. This encourages citizens to visit and build a relationship with the river. The river is also used for transport within the city. There are already discussions to build the metro on a raised platform over parts of the river.
- Agriculture is organic, as well as technologically advanced, including micro irrigation and predicative irrigation scheduling.
- Local food production becomes prevalent again and replaces some of sugarcane and soybean with products to be locally consumed.
- The population of Pune does not expand beyond its carrying capacity (probably near its current population) and instead smaller urban environments come up in the periphery and elsewhere within the basin.
- Solar energy, both in the form of panels and rooftop water tanks, are supported and can return electricity to the grid. Smaller hydroelectric dams are also supported.
- Rooftop water harvesting is used to feed aquifers, as well as directly for non-potable water use.

Rural users have access to dependable energy, and if not immediately, are provided dependable schedules and not during inconvenient hours (night-time).

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Group 5_Host: Avinash

Additional material of this session:

- ***Audio:*** ***2e) Presentation Vision Group 5 – 00:04:07***
- ***Posters:*** ***2e) KeyValue Group5_Avinash_Pune ExpWS***
  2e) Vision Group5_Avinash_Pune ExpWS

Title of the session: Presentation and discussion of visions (future we want)

- **Minutes Keeper: Ines (only from audio and posters)**
- **Facilitator: Avinash**

Short description of the topic, setting and agenda of the session

The idea of the session was to develop in diverse groups a future they want for the Greater Pune Region for 2050.

Summary of the visions (main points, indicate names per group, but minutes without names)

Equal access to natural resources, equal distribution of them, as well as access to infrastructure

Localised supply of water, energy, food (mainly organic)

Local ecosystems are maintained, no desertification of agricultural land

Good and efficient management of resources

Water: ground water is saved, water is used in an efficient way, good policy

Agriculture: also in urban areas, value chain fixed, high-tech ag, industry

Common agency is needed for basin management helping to fulfil the dream

Transport: green mobility in the city and intra-cities, sharing options, less cars

Clean UBB witf a lot of green areas

Quiet city!

Academic institutions are integrated in the economy

Environmental education for children

Key points:

- Localisation and decentralisation
- Water and energy is measured (metering) and well managed
- Demand management efficiency
- UBB management: multi-sector management, green, integrated^
- Bridging rural and urban areas (with right policies)

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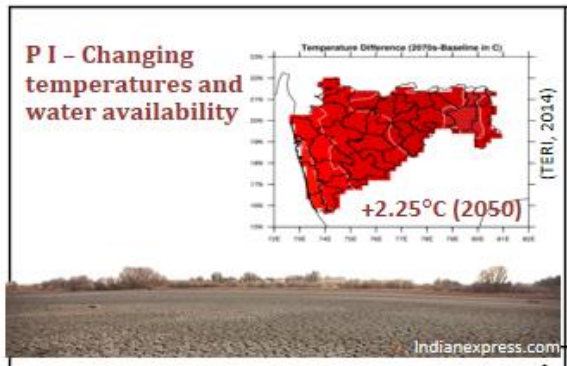
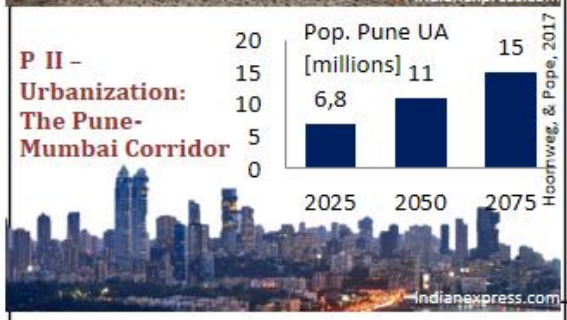
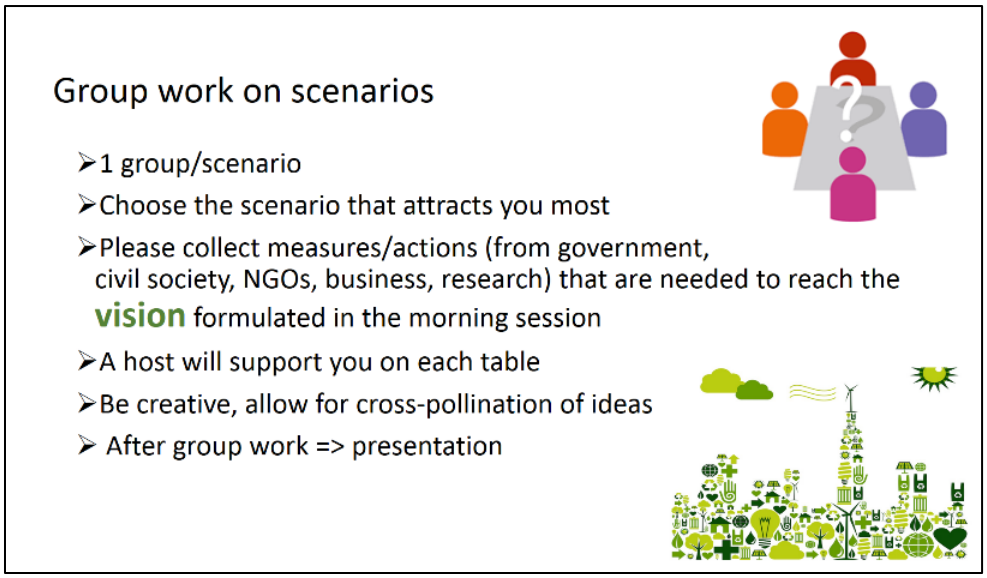
Presentation of 4 scenarios // Working Groups on different scenarios

See slides "3) FUSE_WS_Scenarios_18-20-Feb-2019"

<u>Short summary of perspectives</u>

	Climate simulations predict an increase in average temperature of more than 2°C across the state by 2050. The total annual precipitation is expected to increase slightly, but with likely regional, interannual and seasonal variation. For crops such as rice or sorghum, this may imply decreasing yields. New water allocation conflicts and a further widening of the socio-economic urban-rural and intra-rural disparities are expected.
	The Pune urban agglomeration (UA) has been growing rapidly over the last decades and no end to the population and spatial growth is in sight. The growth of the city entails an increased and more concentrated use of resources like water, and a loss of fertile land at the city's margins. Especially the expressway to Mumbai will attract settlements, forming an urban corridor between the two metropolises.
	Maharashtra is experiencing an industrialization of agriculture: Large-scale, high-intensity, water-demanding agriculture (cash crops, e.g., sugarcane) replace small-holder, subsistence farming. Solar farming might become an alternative to cash crops. Transformation also occurs as natural land is converted to agricultural. The transformation will entail further rural-urban migration.
	Maharashtra's electricity demand is expected to grow until 2030 by 110% and until 2050 by ca. 150%. Reasons are primarily population growth, higher living standards and changing agricultural practices involving energy-intensive water pumping. Renewables have high potential but large investments would be required to keep pace with the growing demand. Poor people may increasingly face energy poverty due to rising prices.

Task given by FUSE team:



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Water Scarcity

Additional material for this session:

- ***Audio:*** ***3a) Presentation Scenario Water Scarcity_Pune ExpWS***
- ***Poster:*** ***3a) Water Scarcity 1_Pune ExpWS***
  3a) Water Scarcity 1_Pune ExpWS
  3a) Water Scarcity Summary_Pune ExpWS

Title of the session: Discussion on policies

- **Time: 14:25 – 16:00**

➢ **Short description of the topic, setting and agenda of the session**

- Policy discussion under P1 – Changing temperatures and water availability
- 1 table with 4 participants,
- Agenda: group discussion on policies for scenario: P1 – Changing temperatures and water availability

➢ **Main discussion points (summary)**

(1) Main outcomes

Potential impacts

- Groundwater depletion
  - Sealing of land
  - Uncontrolled extraction
  - Contamination
  - Increased water prices, especially form slums
  - Competition for water between sectors and user
  - Comprehensive management of irrigation projects/canals will be complex
- Crops, CWR++ (?), Management → failure/losses of crops
- Livestock
- Comfort index, higher min/max temperature
  - More air conditioners
  - Compounds with urban heat island
  - Heat stress, health impacts, epidemics
- More evaporation and humidity in cities
- Streams run dry
- With deforestation more silting (smaller reservoirs)
- Evaporation losses
- Flash floods

New policy schemes:

- Increased rain fall will lead to increased harvesting of rainwater
  - Depends on geology
- Disaster management becomes more important → flash floods: forecasting, management, communication/warning

- Crop insurance: better monitoring
- Reservoir planning
    - Should not only be for one year, but for the whole lifetime of a reservoir (long-term) → think beyond drought years that might come up
- Government funds for projects should have 12 month for use, not just till end of year; esp. O&M (operation and maintenance), costs for village piped networks should be included
- More stringent implementation of laws regarding distribution of water between sectors, regions and different users
    - With increasing scarcity there will be increasing competition for water (higher prices)
    - There are already laws for equal distribution → these laws have to be enforced
- When several agencies cooperate, one a. should have main responsibility → in water and across FEW
- Water policies should reflect spatial variability
- Strong disaster management centre
- Innovative mechanisms

<u>Functional agriculture</u>

- Climate adapted crops
    - Under a scenario, in which there is little water left, how to avoid exporting water? → climate adapted crops that can stand longer droughts
    - Integrated sustainability farming and traditional farming or organic farming
    - Already in place: Maharashtra Project on Climate Resilient Agriculture (POCRA) → capacity building
- Weather forecasts might help farmers, especially with the insurance of farming
    - More weather stations
- Geoplasm banks for local varieties
- Corporative farming → reduces/shares risks, capacity building, capital (divergent opinions whether it helps)
- Better irrigation efficiency, micro-irrigation
- Restricting water-intensive crops
    - assured minimum price for crops with low water-intensity
- Period feedback by universities of agriculture to make sure that innovation can be implemented in the field

<u>Climate Change adaptation</u>

- (see above)
- Promote water accounting training
- Green buildings (and vehicles)
- Cleaning existing water ways
- Growing trees → Micro-climate

<u>General assessment – What is needed</u>

- Better policy implementations
- better dialog between the agencies (across the sectors and also between high- and low-level agencies; top-down – bottom-up)

- Integrated basin policy → spatially integrated
- Creating awareness among local people
    - Can create 'consumer power' (farmer will grow what is demanded → "Need based not greed based")
- Avoid misconceptions/wrong policies that are symbolic but do not solve any problems

➔ With all measures implemented optimistic vision for the future → at least for the short term. For the longer term, we need to stop periodically and reflect, what worked well, what do we need to improve

(2) <u>Further discussion notes</u>

<u>Issues that will become worse in scenario:</u>

- Disparity will increase, poor will pay more, have worse health, sanitation, etc.
    - High-income can self-provide clean water, air-condition, etc.
- Pune center will have surplus water due to saucer-shape
- Equitable is more important than 24/7 water
    - Even now, people have to get up at night, wait 2-3 hours for water, loose jobs, school, etc.
        - This can lead to riots, unrest
        - High impacts on females, responsible for water → girls don't go to school, have health issues from carrying
- Waterborne diseases and sanitation issues
- Migration because water shortage is worse elsewhere

<u>Behaviours:</u>

- More people working in water delivery
    - Delivery of water in small containers exists already, will grow
- More wastewater treatment
- Prices will increase
    - PMC only delivers free potable/drinking water
- This situation will require strictly enforced laws (currently laissez-faire, because severity is not visible)

<u>Strategies:</u>

- We should plan for the whole (micro-)watershed, divided into water-generating/-consuming/-conserving areas
- We will need to switch to low-water use crops (currently water is net exported)
- We need to change habits to reduce effects of climate change
- How to we protect water generate.?
- Water should be used more equitable, there are already laws, which has to be enforced stringently
- Especially in summer, water should be reserved for households ?
- Economic growth → change GDP definition
- Use of water for agriculture/Households

Working Groups on different scenarios: Water availability changes

- Waterbudgeting with regards to every community
- Water saving techniques
- Awareness creation is a must

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Urbanization

Additional material of this session:

- ***Audio:*** ***3b) Presentation Scenario Urbanization_Pune ExpWS – 00:15:22***
- ***Poster:***

Title of the session: Scenario Session Urban

- ***Time: 14:25 – 16:00***

General/Governance

- Urban centers operate in legal and administrative system
- Third level of governance important for local politcy making
- Metropolitan planning commission
- Eminent domain: federal govt, functional domain: local body
- Check for further planning standards and legislation:
    - CAA74 self government act 12 schedule constitution
    - Mah. Municiaplities corporation act
    - Mah. Regional and Town Planning Act
    - Revenue Code: land revenue, tax collection
    - Townships: 100 acre township policy
- Municipal Corporations have to notify other villages before incorporating them, they have to agree (around Pune, only ca. 20 of ca 36 agreed)

Urban/Slums

- Basis: people cannot afford land
- **Food (and other consumption) are not a major problem**. Pune's slums are comparatively well off
- More than 50% of slum residents have jobs in vicinity
- After occupying a building for 12 years, residents receive ownership (only house, not land)
- Undeclared slums have same rights and infrastructure access to declared slums, just less political patronage
- Town planning scheme (old system)
- Land conflict needs to be solved by the people
- Mun Corp takes construction charge for developments→ have interest in project implementation
- Land outside PMC coordinated by PMRDA
- Currently, neighbors of PMC do not get anything from city
- Tax incentives foster inefficient land development
- Regional development plan to be included in model

- Ready Reckoner Rates: assess value giving norm price of land, can pay more

Water

- Pune 24/7, area development, possible to reach in time, starting in old town
- Combined drainage and sewage system, capacity never catches up with waste water volume increase
- Water tax in Pune has not been raised for a long time

Land Transformation

Additional material of this session:

- ***Audio:*** ***3c) Presentation Scenario land transformation_Pune ExpWS – 00:08:40***
- ***Poster:***

Title of the session: Scenario Rural Transformation

- ***Time: 14:25 – 16:00***
- ***Minutes keeper:***

After Ines explained situation and challenges, following were reactions from the participants

1. Knowing that small and marginal farmers are moving out of agriculture, it was suggested to work on a legislation to form a family company (ideally exempted from taxes) so that small land holders could diversify livelihood without sealing their lands for non agriculture purposes. Role of Panchayati Raj Institutions needed special attention in this legislation for creation of institution

2. Cluster approach could be taken, where the cluster could be defined based on population of 20 or 40000 people or it could be revenue / Gram Panchyat. (depending on the land record availability). The cluster needs to have provisions of primary processing for value added services for different types of crops. A value chain needs to be developed for entire cluster

3. Attention needs to be given to reduce intermediary by compressing value chain

4. Organic certification process is useful however it is very expensive. Participatory organic farming certification could be promoted and could be linked with the Agro- tourism

5. Support systems are weak and there is need to have informed support systems at village level

6. Basic services needs to be provided at the rural level

7. Data relevant to crop based processes needs integration, which would mean understanding present data sets and suggesting newer formats for data collection

8. Water Budget or credit systems needs to be popularized through participatory processes.

9. As cities are drawing resources from the rural areas, there is need to find ways to how cities like PMC and PCMC could pay back to rural areas (in forms of services or in kinds)

10 Teach for India experiment has helped engage highly paid technical people to be part of education systems. It wold be worth experimenting with Farm for India

11. Focus of promotion of agriculture could be through secondary students and there is need to good Environment (agri-system based) education at school level. Bio-cultural camps for students could provide opportunity for urban students to understand agro-based eco systems and services

12. User friendly content could be developed to motivate farmers to continue in agriculture. Farmers to Farmer platforms could be strengthened. It is worth looking at the MKCL farmer call center experiment.

13. Social Audits of Agriculture scheme needs to be integrated to assess the performance and response to the Govt schemes on Agriculture

14. Sangram Cell's with in Panchayati Raj Institutions and their role needs to be understood.

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Energy Demand

Additional material of this session:

- ***Audio:*** ***3d) Presentation Energy Demand_Pune ExpWS – 00:04:25***
- ***Poster:***

Title of the session: Discussion on policies

- ***Time: 14:25 – 16:00***

➢ **Short description of the topic, setting and agenda of the session**

- Policy discussion under P4 - Electricity demand increase and insecurity
- 1 table with 4 participants
- Agenda: group discussion on policies for scenario: P4 - Electricity demand increase and insecurity

➢ **Main discussion points (summary)**

- Current situation and tendencies:
  - Energy system is not in practice in India <- no functional authority
  - Demand of electricity is linked with economic growth, and especially relates to industrial sectors. The industrial growth leads to increasing energy demand, while the industrial growth depends on international economy rather than domestic economy.
  - Energy demand depends on policies (more investment, more demand)
  - No scarcity in energy in Maharashtra -> electricity can always be transported from other parts in India
  - Continuous electricity supply in Pune
    - Thursdays are scheduled interruptions due to network maintenance)
    - Only electricity for pumping water for agriculture is constrained
  - Total storage capacity in India is 303 gigawatt.
  - More electronical-cars, more street lights are used
  - Tata centre has huge energy demand, and huge amount of resources is allocated to Tata dams (also with more electricity demand)
  - More domestic users have solar PV on rooftop
  - Slums cannot get electricity because safety standards are not met
    - They are giving sub-meters and the small slum electricity companies are charging their companies
- Energy for agriculture / in rural area:
  - Solar power for agriculture program since 2018
    - How fast is this possible? New ones have to be solar-powered
  - Power purchase costs 6-7 Rs, but around 3 Rs for solar pump
  - Cross-subsidy burdens the authorities so that they reduce electricity supply to rural area as a result
  - Prayas has done a study on integrating renewable energy into conventional supply system in rural area-> proved in Maharashtra (no more new connections for conventional ones, only new RE connections)

    - Groundwater waste is an issue -> they will never switch off the pumps
    - Mahadiscom is under political pressure
        - Transformer failure only in rural
        - Local politicians make sure certain people get power
    - Pilot project on one of the feeders in Solapur, 100 percent
    - Farmers have multiple pumps
        - Everybody claimed to have 3 horsepower but they had 9 in reality (the name plate is changed) -> the actual load is much higher
    - There is correct data on substation level
    - Agricultural feeders get power by rotation
    - Solar pump might reduce the financial loss of electricity distribution, but also create problems
        - Currently Mahadiscom does not make revenue from agriculture -> only 8 percent of the charges are collected, solar might reduce that
        - Problems for Mahadiscom: generation facilities need to be ramped up and down
- Possible measures:
    - Use hydro power for balancing, get it from Nepal and Bhutan
    - Gas is the second choice that has to be imported
    - Solar storage
        - It becomes a game changer only when affordable storage is available
    - Balancing and base load have to be combined reserve capacities get higher tariff
    - All of this increases the tariff
    - Demand response schemes
    - To solve unofficial connections e.g. in certain slums:
        - LT wires can be replaced with HT wires, then theft cannot occur
        - Wires can be put underground (utility lines)
        - Maharashtra has a policy for it
        - Local linesmen get help from utilities, some safety measures
        - Local linesmen are employed by Mahadiscoms, they are officially private but unofficially used to supply slums
    - HT adoption requires major capital investment
        - There is DC in Maharashtra
        - These are especially useful to reduce transmission lines
        - How can this investment be done? It would be possible to do it with commercial Mahadiscoms
    - PFC and Rural electrification company - payback is difficult
    - Energy security could be increased through nuclear
    - Bioenergy?
        - Affects food and cattle population
        - What about waste? Both bio and waste cannot contribute much
    - Concerns on competition with drinking water supply (e.g. Hydropower) exist.
    - Argument on Keeping water in the dam and use water for other purpose -> political issues taken care by relevant officials -> discussions needed, number of people involved -> decision on political level

- Bureau of Energy Efficiency published many reports
- World Bank project: DRUM

Outlook and Checkout

Title of the session: Outlook and check-out

- ***Time: 17:05 – 18:00***

➢ **Short description of the topic, setting and agenda of the session**

- Main take-away of FUSE team & participants
- 7 tables with 25 participants

➢ Want to know more about information, publication of previous projects

➢ **Check-out round (clustered answers, without names)**

Bring people from different backgrounds together and try to find solutions	Integrated approach for Pune
Participation is what we need to approach problems	Thinking in the right direction and doing the actual work
Strong vision on how sustainable Pune would be look like	Bring different sectors together for 2050 planning
Intermediaries are important	Data dissemination helps decision
Every problem has a solution	Interdisciplinary studies needed for water solution
Multi-disciplinary approach to solve problems	Dare dreaming sometimes
Pune and Jordan are comparable	Fun to solve social problems
Proper approaches for proper solutions	Looking at all nexus dimensions
Good input leads to good modelling	Collecting raw data is important
Many insights	The workshop helps putting pieces together
Looking into details	Both top-down and bottom-up approaches
Much learning within short time	

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Update and Validation Workshop

January 28 2020, Pune

Overview validation workshop

The update and validation workshop was intended to present the beginnings of the integrated FWE nexus model, in which the information and input from the workshops in February 2019 are being incorporated. This workshop was organised in cooperation with the Centre for Environment Education (CEE) and facilitated by its program director Sanskriti Menon. The combination of presentations by FUSE and ACWADAM were met with great interest. About 40 participants from research, policy and civil society attended the workshop, most of which had participated in the previous year (see Excel table).

The project team presented some first insights and findings with a focus on the relation of the food-water-energy nexus to urban growth and on hydrologic assessment and modelling. The conceptualization of the model was the basis for discussion and attracted many questions, insights and suggestions for improvement.

The workshop served as a validation of a first set of FWE challenges derived by the project team based on the previous set of workshops. In order to do so, participants were asked to rank the proposed challenges by giving 0-3 points. Additional comments were noted as well.

Of interest were questions about the inclusion of legislation and reservoir operation practices, flood risk and green spaces, and leakages in pipes and canals. Although we cannot include erosion and sedimentation of dams, we have a valuable data set shared by the Basin Simulation Office and National Hydrologic Project to help us calibrate the flows from reservoirs. Green infrastructure and other policy options will be included via scenarios, which include a business as usual scenario that extrapolates current practices. Importantly, we heard the suggestion to avoid one-way ("silo") thinking and to make sure we include reasonable leakage that accounts for the impact of groundwater-canal flow interactions. This of course raised a question about data since the estimates for leakage are not well-documented.

The team sought the help of participants to fill data gaps. Many of the hydrology data gaps were filled by the strong support of the Water Resources Department and associated offices including the

Pune Irrigation Circle, National Hydrologic Project, and Basin Simulation Office. Our partnership with the Gokhale Institute helped improve our understanding of the agricultural data. We still aim to strengthen our understanding of urban water.

Dr. Himanshu Kulkarni's presentation on the results of ACWADAM's Pune aquifer mapping met with great interest and certainly made an impression, which was evident when we asked participants to rank some of the most pressing food-water-energy challenges and unregulated groundwater abstraction rose to the forefront. This is great feedback, since we plan and have capacity to include this in our integrated model. Finally, we received advice regarding engagement of students and ensuring that the model can be used by programmers as well as non-programmers. The project team is open to partners and students that may be interested in experience with a large international project. Furthermore, we will aim to clearly communicate our insights and results. We are exploring possible ways to enhance the capacity building element of the project to support the transfer of our integrated model to water managers and planners, among others.