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SURVEY ON SOCIO-ECONOMIC IMPACT FOR WETLAND+®

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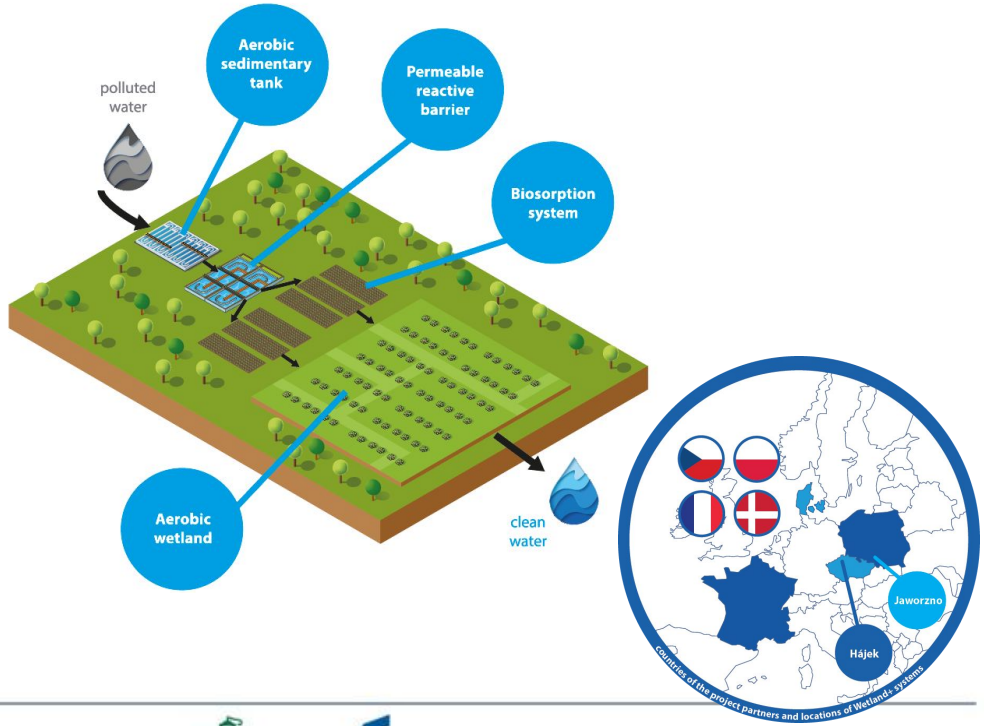
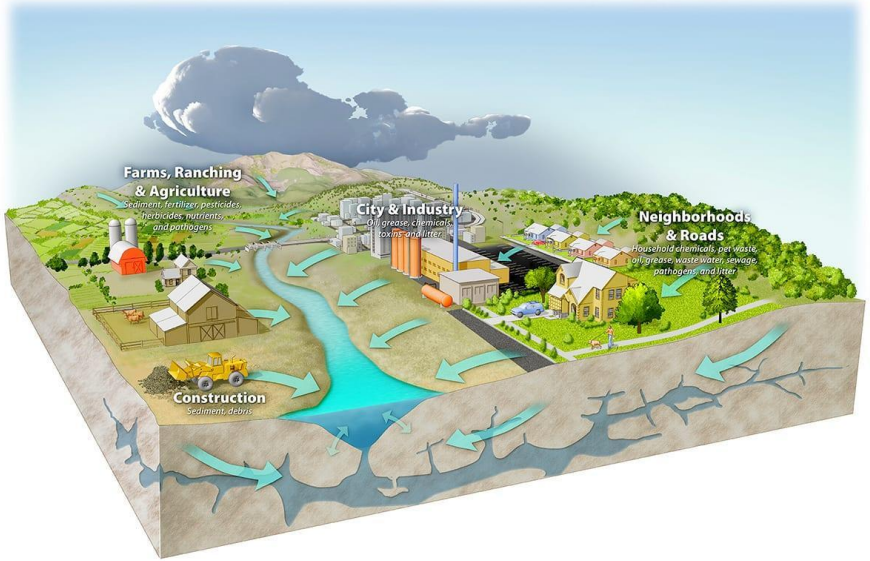
- Our solution – Wetland+® system
- Result:

Wetland+® >> WWTP >> No-action



Problem and its solution

- Contamination of waters
- Need for cleaning ▫ sources of drinking water are limited
- Different scenarious
- Selection of the best one
  ▫▫
  based on ecology, money, but also soc
- ▫ Sustainable remediation process



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Sustainable remediation process

- Benefit is greater than its impact
- Sustainable remediation is site and project specific
- Best solution is selected based on balanced decision-making process (e.g. CL:AIRE 2010, ISO 18504:2017)
- Indicators: environmental, society, economic (balanced)
- It is a multifactorial task ▫ 15 indicator categories

Indicator categories

Environmental	Social	Economic
ENV1: Emissions to air	SOC1: Human health and safety	ECON1: Direct economic costs and benefits
ENV2: Soil and ground conditions	SOC2: Ethics and equity	ECON2: Indirect economic costs and benefits
ENV3: Groundwater and surface water	SOC3: Neighbourhoods and locality	ECON3: Employment and employment capital
ENV4: Ecology	SOC4: Communities and community involvement	ECON4: Induced economic costs and benefits
ENV5: Natural resources and waste	SOC5: Uncertainty and evidence	ECON5: Project lifespan and flexibility

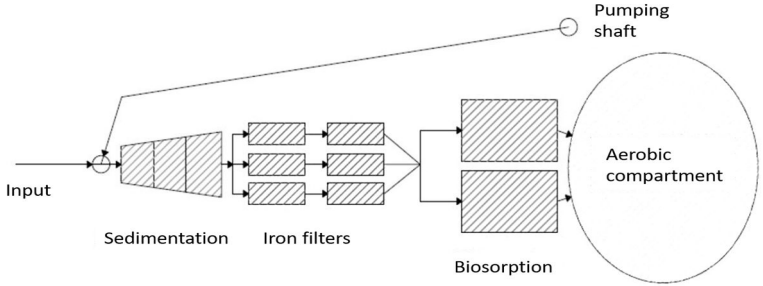
The process

- 3 steps:
  - STEP1: an initial sustainability assessment by a small core team (principal investigator, an SEI expert, expert on water treatment technology)
  - STEP2: an interim assessment by all project beneficiaries
  - STEP3: a final assessment by external stakeholders (local or regional authorities, environmental authorities, watershed authorities and local NGOs)
- Methodology:
  - 15 categories covered by 73 questions
  - sellection of appropriate questions
  - comparison of alternative technologies (ranking: 1=best, 3=worst)

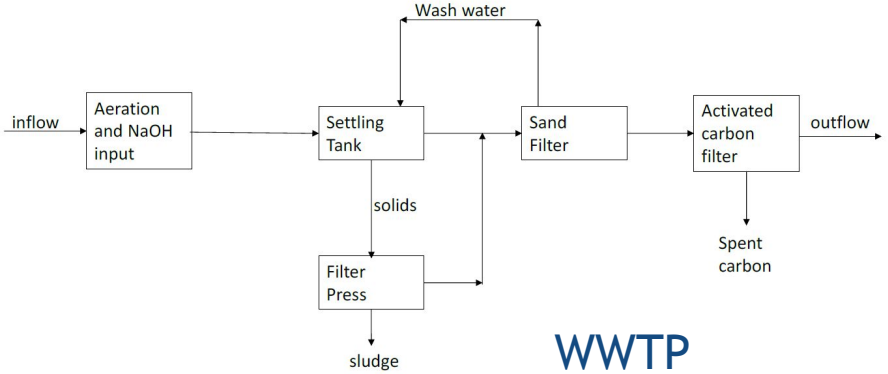
Step 1: internal assessment (small team)

- 45 criteria identified as relevant (e.g. Acid rains NOx, SOx; Effects from dust, light, noise, odour during works not relevant) out of 73

- 3 alternative technology: Wetland+® x WWTP x no-intervention (no applicable)

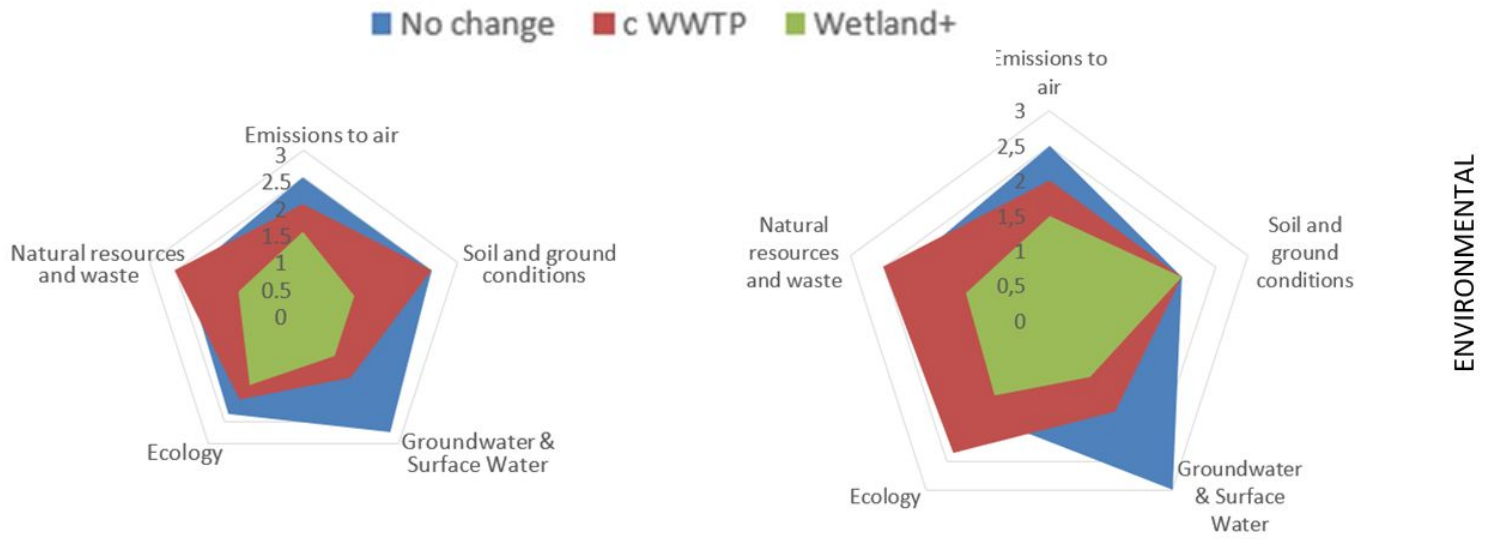


Wetland+®

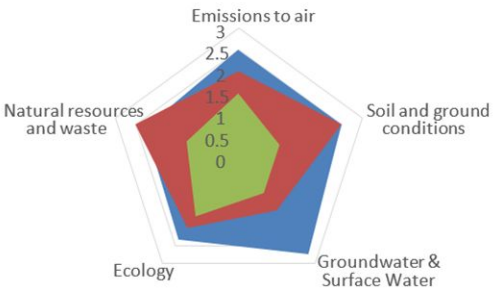


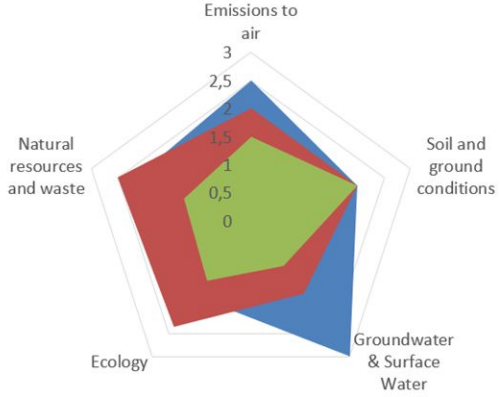
WWTP

STAGE 1 **STAGE 3**



smallest the area = better marking = better technology



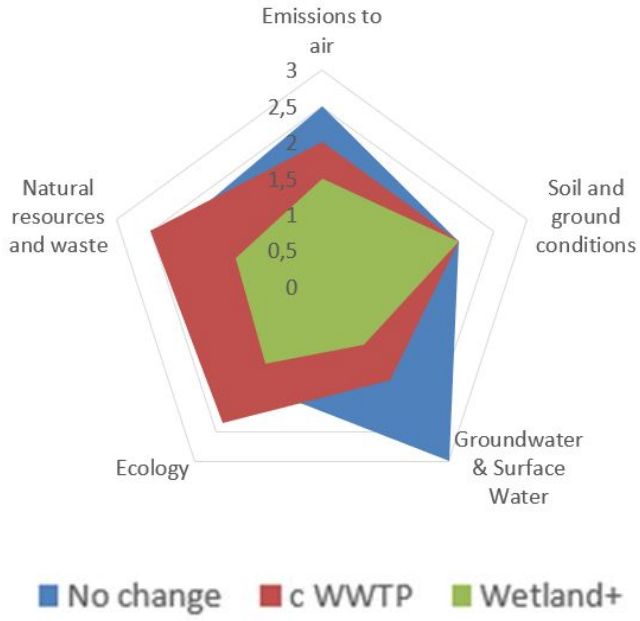


ENVIRONMENTAL

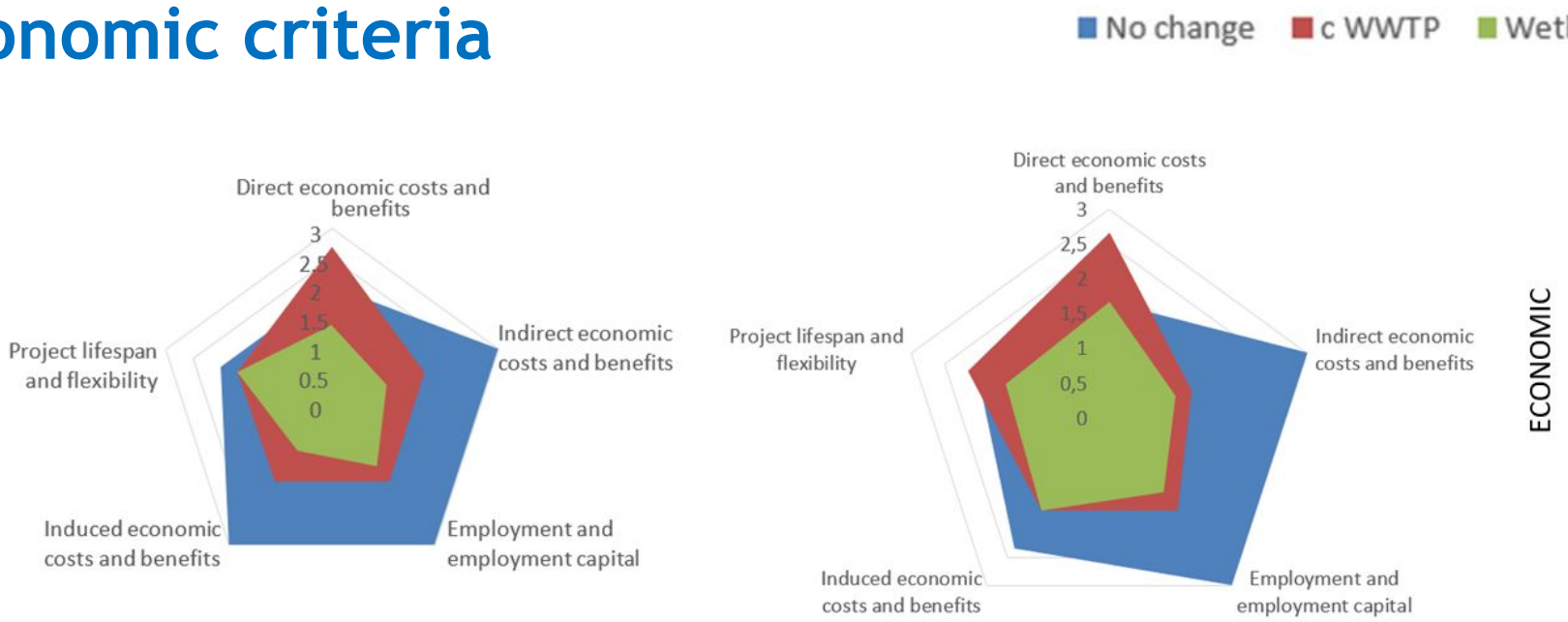
- In general: STEP1 and STEP3: radar charts look different, but their result is virtually the same (valid for economic and social as well)
- Broader team, public, and external staholders have a similar assessment like the core team
- Wetland+® >> WWTP >> no-intervention

Environmental criteria

- Wetland+® is the highest-rated scenario
- Emissions to air: Wetland+® generates greenhouse gases, WWTP use fossil carbon in energy and resources.
- Groundwater & Surface Water: Both improve water quality; Wetland+® outflow water contains an aquatic microfauna and plankton that the WWTP would not.
- Natural resources and waste: WWTP generates waste; Wetland+® use of locally generated recyclates (woodchips)

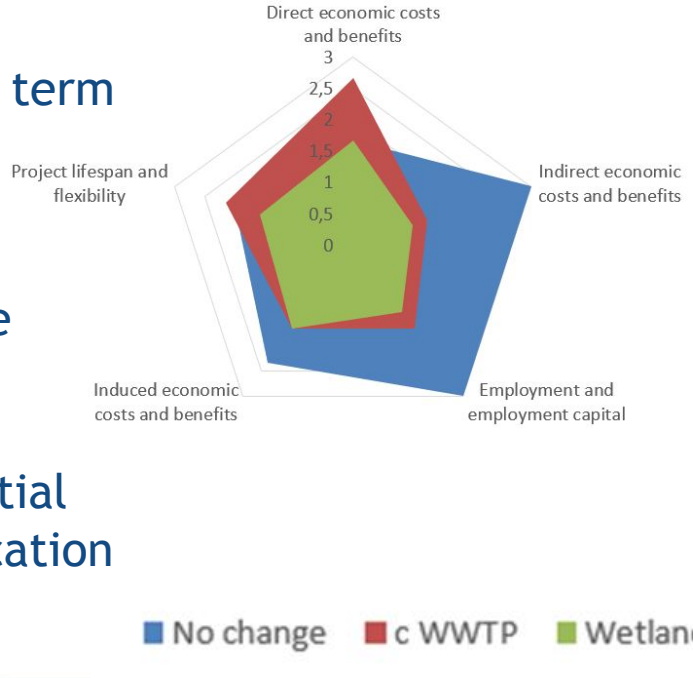


Economic criteria

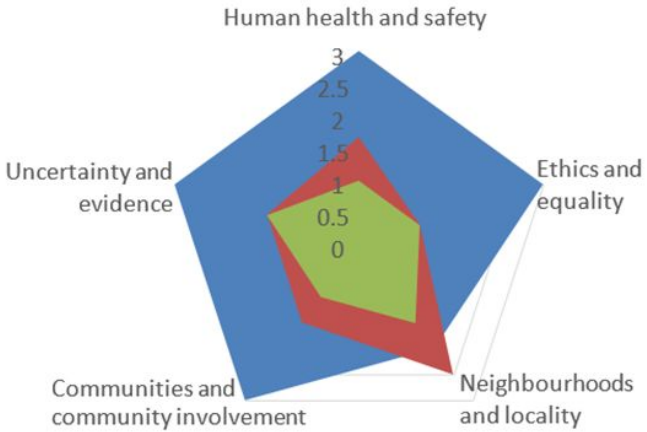


Economic criteria

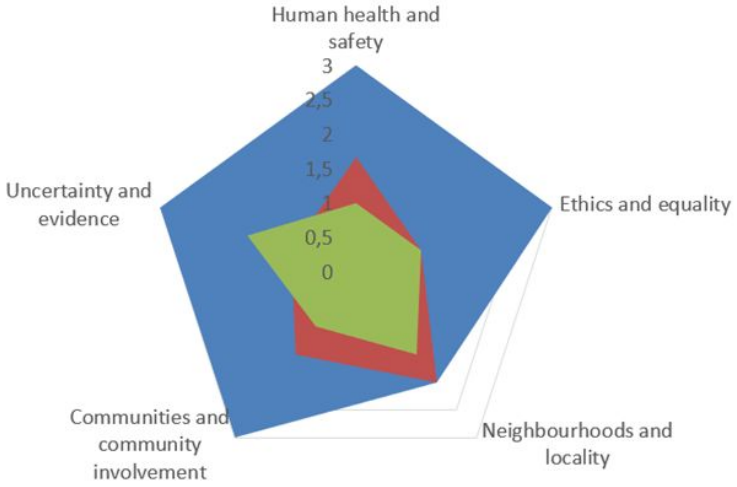
- Wetland+® is cheaper than WWTP over the long term no-intervention = no cost
- WWTP - higher degree of control, BUT costly operation, and monitoring
- no-intervention: damaging reputation of the site owner; solution postponed the to the future
- Wetland+®: the chance for replications
- WWTP has the greatest local job creation potential
- Wetland+®: opportunities for school visits, education



STAGE 1



STAGE 3

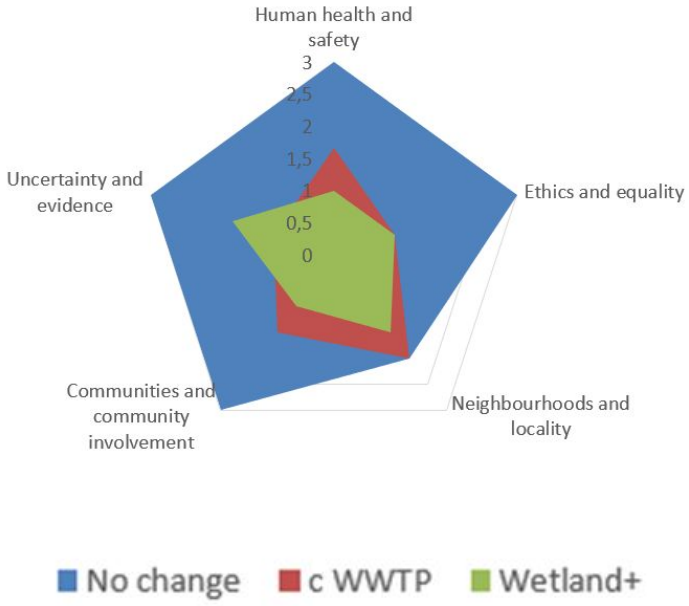


SOCIAL

No change c WWTP Wetland+

Social criteria

- Ethics and quality: No-intervention = the problem postponed to future generations
- WWTP: risk for workers (daily operation)
- Both improve the amenity of the river downstream benefiting local communities (fishing, hunting, recreation)
- WWTP: well established, more straight forward process control
- Wetland+®: new and unproven technology (in full scale)



Wetland+

+ Low emission
+ Biodiversity increase
+ Less expensive solution
+ Increase of land value
+ Education facility
- Not-proven technology

WWTP

+ Creation of jobs
+ Robust and standard treatment
- Waste production
- Operational costs
- Workers risks
- Risk of crime

No action

+ No energy, no CO_2
+ No Waste

- No eco limits fulfilled
- Problem postponement to next gen.
- Hunters and fishers problems

Thank you for your attention
Questions?