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Effect of Concentrated Solar Power plants on the socioeconomic and livelihood assets of the local community and environment

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Context



- CSP plants are a good source of renewable energy
- However they can positively and negatively affect the livelihood assets of the local populations, e.g. noise, land loss, employment, regional development.
- It is important to evaluate these potential positive and negative impacts that could occur during all phases of a CSP plant, from planning to construction, operation and decommissioning.

Main objective



To assess the impact of CSP plants on different stakeholders (communities, policy makers, owners and operators) with a specific focus on the local economy and environment

Established an all-encompassing framework for the study of the socio-economic and livelihood aspects of CSP plants

Framework development



To develop the framework, we've already:

- Determined the various capitals that can be affected by CSP installations: Natural, Physical, Financial, Human and Social
- Considered the relationship between different capitals and how they can be affected all together by one external impact (e.g. Natural disaster)



*: J.Lax et al., Livelihood Assessment, A participatory tool for natural resource dependent communities, Thünen, 2013

Framework development



Sustainable Livelihood framework



• Literature review

SolarPACES 2019 – Daegu, South Korea

Livelihood assets key factors





Natural capital



Land Value and Access

- Change in land value
- □ Change in land use pattern
- Competition over land
- Soil sealing
- Change or sterilization of cultivated land due to power plant activities
- Soil loss/ erosion
- □ Fire risk (particularly when using synthetic oil as a heat transfer fluid)

Agriculture Activities

Physical capital

Change food security

Natural capital

- Promote sustainable agriculture
- □ Change in agriculture activities in the region
- Deprivation of farming livelihoods

Visual and Audial Impact

- Noise pollution
- Effect of dust and vibration on psychological well-being

Water Security

- Change in water access
- Change to availability of drinkable water (by using CSP for water treatment)

Pollution and Waste

- Change in air quality/ Environmental pollution
- Effect of plant's waste
- Risks of production of hazardous materials and waste

Biodiversity

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- Change in the nature of the landscape(from rural to industrial)
- □ Change in biodiversity of the surrounding land
- □ Cause natural disaster (drought...)
- Mortality risks to avian species/flora and wildlife in the region
- □ Displacement risk to avian species/flora and wildlife in the region

Changes to Water Quality

- Underground water salinization
 - (Increase level of salt in water)

Human capital

Underground water contamination

Financial capital

Social capital



Regional Infrastructure:

- Strain on regional infrastructure and services
- Change regional socio-economic and infrastructure development
- Improve road network access for ambulances, tractors...

Energy Infrastructure and Energy Access:

- Change in access of electricity
- □ Change in energy security

Services:

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- □ Change access to transportation
- □ Change access to electricity
- Change access to health facilities clinics, hospitals...(for example, electrifying hospital throughout the night by CSP storage)
- □ Cause water shortage in the region
- □ Change in the main activity of household leaders

Natural capital	Physical capital	Financial capital	Human capital	Social capital
SolarPACES 2019 – Daegu, S	South Korea	8		© Cranfield University 2019

Financial capital



Local Business

- Impact on economic participation of microscale SMEs
- Economic participation and benefits for local SMEs

Prosperity and Employment

- Contribute to poverty reduction
- Change of regional prosperity
- □ Change of disposable income in agriculture activities
- Diversification of economic activities of the local communities
- □ The inclusion of local enterprises (Creation of new start-ups)
- □ Change in the income sources of the community
- □ Change in employment opportunities (temporary or permanent)
- Create temporary job positions
- □ Change in the wage of workers
- Competition over available jobs position

Price Stability and Living Standard

- □ Change socio-economic situation and living standards
- Change in daily living
- Change of production, prices of goods and services
- Change of the economic profile of the area and its visibility as an investment destination
- Change of local purchasing power which changes living standards among low-income groups

Natural	conital
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Human capital



Public Awareness:

- Change public interest in renewable energy systems and civil society engagement
- Change the awareness of environmental issues
- Change in information availability, access and quality

Working Conditions:

- □ Job loss (due to reduction of agriculture activities)
- □ Change in labour standards
- □ Change Job competition

Technology and Knowledge Exchange:

- Change in technological capacity of local firms
- Training opportunities

Skill Development:

 Mismatch between educational qualifications and labour market requirements

Health and Safety:

- Promote wellbeing
- Change in level of health and nutritional status
- Change waterborne diseases and pollution
- □ Risk to worker health and safety

Natural capital Physical capital

Financial capital

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Social capital





Community Culture and Sense of Place:

- Change of local pride and gain for regional reputation
- □ Change in culture identity

Community Cohesion and Conflict:

□ Social conflict

□ Change in existing conflicts

Equity and Gender Equality:

- ❑ Women discrimination at work
- Inclusion of woman in socioeconomic activities
- Poor and unequal labor condition
- Provide access to affordable and reliable electricity for all

Community Acceptance and Participation:

Mistrust due to lack of transparency in information provision

Population Size and Social Structure:

- Change in social networks
- Effect on population size (Migration)
- □ Change in the quality of life
- Change in the social level (new social classes)
- Change in attachment to traditions

Natural capital

Framework parameters and criteria





Developed framework



			Planning						Construction						Operation and maintenance						Decommissioning						
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	Local Business																										
	Prosperity and Employment																										
	Price Stability and Living Standard																										

What's next...





Summary and Future Work



- Framework developed to consider the impacts of the installation of a CSP plant on the local population.
- Next steps are to "fill-in" this framework with the views of the local people and experts in the field.
- Targeting five countries within the SOLWATT project, selected based on the project phase and maturity of the CSP plants in each selected country
- Results expected in the next 2 years.

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