SESSIO 1

Extractivisms and alternatives

Tuesday, May 18th, 2021 at 12.15 - 14.00 (EEST, UTC+3)

Session conveners

Associate professor **Markus Kröger**, Doctoral Student **Sophia Hagolani-Albov**, Postdoctoral Researcher **Ossi Ollinaho** (University of Helsinki), Assistant Professor **Annukka Santasalo-Aarnio** (Aalto University)

Description

The session is robust exploration of renewables, recycling, and new tech developments that could help to address the current forms of destructive and unsustainable extraction of raw materials.

The topic of extractivism is gaining more importance as a new key concept that helps to understand, at a deeper level, the causes of destructive resource extractive projects and overall political economic models built on this extractivist paradigm. There is a growing debate around how to find alternatives to destructive extractive processes, and how to identify and implement alternative ways to provide raw materials and create sustainable livelihoods and production processes. This session will focus on unsustainable extraction practices and the technological and political solutions that stand as alternatives in the face of extractivism. We invite presentations that explore renewables, recycling, new tech developments, and how these measures could be adopted to ameliorate the problems of extractivism. We want to explore the political, economic, and socio-environmental factors that could impede or support the adoption of these potential alternatives.

The session will create opportunities for dialogue and development of common vocabularies across disciplines. The conveners of this session come from diverse backgrounds including the social sciences, business, and engineering. We welcome a collaborative approach to a robust exploration of renewables, recycling, and new tech developments that could help to address the current destructive and unsustainable forms of extraction of raw materials—including, but not limited to, mining, agriculture, forestry. We strive to pave the way for future collaboration and looking at these issues from inter-, trans-, and multidisciplinary perspectives

Speakers and their presentation titles

- Circular textile economy: social and environmental synergies or tradeoffs? **Anna Härri**, **Helena Dahlbo**, and **Jarkko Levänen**
- Critical factors for enhancing the circular economy in waste management, **Hanna Salmenperä, Kati Pitkänen**, **Petrus Kautto** and **Laura Saikku**
- Reusing mine tailings as cemented paste backfill material (CPB), **Soili Solismaa** and **Tommi Kauppila**
- Saving the Environment by Being Green with Fintech: exploring the contradictions between environmentalism and reality in the case of Ant Forest, **Zeng Zhen**
- Exploring Kiertovalu, **Tommi Sappinen**
- Why is agroforestry not expanding but industrial monocultures are expanding in Brazil?, **Markus Kröger** and **Ossi Ollinaho**
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Commentator **Ulla Heinonen**, Gaia Consulting Oy.

Circular textile economy: social and environmental synergies or tradeoffs?

Anna Härri, Riina Antikainen, Helena Dahlbo and Jarkko Levänen

The dominant textile paradigm, characterized by fast-fashion and low-quality textiles, generates heavy pollution, emissions and waste and relies on low-cost work with frequent human rights violations. The transition to a circular textile economy has been envisaged as leading “to better economic, environmental, and societal outcomes, capturing opportunities missed by the current, linear, textiles system” (EllenMacArthur Foundation, 2017). Despite the promising starting point, the environmental and social impacts of CE transition in the textile sector are largely unknown (Millar et al. 2019; Saidani et al. 2019; Merli et al. 2018).

Reducing the negative sustainability impacts in one part of the production and consumption chain may lead to higher impacts in another part (Kircherr et al. 2017). Interdisciplinary research is needed to understand the sustainability implications in different spatial and temporal dimensions. The aim of this research is to investigate the sustainability impacts of new textile CE practices in an integrated manner. Our approach includes a literature review and a case study, in which a Finnish company aims to buy crop residues from Indian farmers to produce textile fibres. At present, the straw is mostly burned, and this contributes to environmental and social problems.

Our research questions are:

1.What are the main environmental and socio-economic implications of different scenarios for usage of agriwaste?

2.What are the potential socio-economic and environmental synergies and tradeoffs of the novel CE practices?

We investigate socio-economic and environmental aspects based on three scenarios: 1. Burning of straw (business as usual), 2. Plowing the straws into soil (soil amendment, carbon capture) and 3. Collecting and selling straw to outsiders (potential use in multiple purposes, including as textile fibre and bioenergy production).
The primary research methods will be semi-structured interviews and a questionnaire with farmers in India. In addition, other stakeholders will be interviewed and secondary data collected.
Regarding the environmental implications the attention will be on the most relevant impact categories, such as resource use (including material and energy consumption, water and land use), climate impacts and hazardous substances (incl. pesticides and process chemicals). The case specific data will be supplemented utilizing life-cycle databases when applying the Life Cycle Assessment (LCA) methodology for the study.

We expect that the socio-economic findings will be related to for example monetary compensation, conditions of work and potential for job loss/gain. Regarding environmental aspects, there are potential tradeoffs for example in soil quality, carbon storage and resource availability. Tradeoffs between social and environmental sustainability might also occur. Selling the residue might for example decrease soil quality and increase use of fertilizers but enhance the livelihood of farmers.

Sustainability Science Days 2020, session 1: Extractivisms and Alternatives: Bridging Disciplinary Understanding Structural issues, such as institutions and inclusion in decision making are expected to be potential barriers and enablers for sustainability. We conclude that advancement of circular economy in textile sector will require in-depth understanding of multi-dimensional sustainability implications throughout value chains as well as inclusion of local stakeholders, especially those in marginalized positions.

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Critical factors for enhancing the circular economy in waste management

Hanna Salmenperä, Kati Pitkänen, Petrus Kautto and Laura Saikku

Circular and efficient material use is challenged by present practices. The current way of managing waste needs revising in order to increase material cycles. Majority of earlier studies on key factors in promoting the circular economy have been theoretically oriented and general, whereas this study aims to increase the understanding of critical factors faced by practitioners in the transition towards the circular economy specifically in looping wastes.

The focus of this study was on 25 cases promoting waste prevention and recycling in various industries. Practitioners implementing pilots were interviewed on the barriers and success factors they encountered in their practical work. Their perceptions for barriers were further analysed with a developed framework on the role of waste management in the circular economy. The critical factors described in this study are to some point comparable to the ones found in earlier research. Analysis of barriers indicate that different barriers are often linked together. Barriers in waste recycling are mainly connected to a lack of information on waste streams, the economic benefits of recycling, and environmental impacts and risks. In addition, the utilisation of waste suffers from operators' uncertainty about the availability of materials and unclear revenue logic. In a circular economy, the role of waste management is to promote the retaining of material value in the cycles through recycling. This study points out that this could be done by cooperating in novel ways and generating information on material flows. Developed data systems and open data sharing are needed to facilitate the utilisation of waste streams. Also waste prevention can be promoted by waste operators. Processing waste-based materials involves business potential, and there is a need for waste operators to develop new business models, or for entirely new operators between waste management and various industries to emerge

Reusing mine tailings as cemented paste backfill material (CPB)

Soili Solismaa and Tommi Kauppila

The ERDF funded Kove-Pro project aims to develop sustainable methods to reuse mine tailings as cemented paste backfill material (CPB). Using CPB as support and backfill material in the underground mine facilities reduces the volume of tailings which require surface disposal and may cause hazards for the environment. The possibility for acid mine drainage (AMD) decreases when tailings are dried, mixed with cement providing extra neutralization capacity, and stored in less oxidative conditions underground compared to oxidizing surface conditions. CPB and the geotechnical support it provides, allows mining methods that result in more complete utilization of the deposit. In addition, replacing part of the cement with secondary raw materials reduces CO2 emissions and extraction of limestone.

GTK studies the geochemical and mineralogical properties of sustainable CPB raw materials (mine tailings, incineration ash and slag) and tests and compare chemistry, mineralogy, structure, and environmental properties of CPB test blocks. The blocks are manufactured with different CPB recipes by Savonia University of Applied Sciences, the coordinator of the project. Environmental properties of the blocks are evaluated on the basis of column tests that are performed according to a modification of the standard Up-flow percolation test SFS-EN 14405:2017. Columns are filled with mine tailings and different CBP materials and treated with real mine water. The water is sampled periodically and in the end of the tests the mineralogical, chemical and structural properties of the solids are measured. The results give information of the leachable elements and environmental performance of the CPB in underground conditions, during the active period of a mine. As a result of the project, the solutions for low impact and low footprint mining are developed. This allows placing a large part of mineral processing tailings back underground into mined-out cavities.

Expected contributions to the discussions of the selected theme:

-Extraction and refining process have to be tuned as efficient as possible, all valuable minerals need to be used if possible, not only one or two ore minerals. This will reduce the amount of waste as well. It is not possible to obtain all the materials for our needs via recycling in these times when battery mineral sand new technology is needed to stop the climate change.

-Using CPB enables maximal extraction of the ore

-Recovering valuable minerals from historical mine wastes to substitute primary materials reduces the need to extract primary materials. However, this requires changes to the legislation. If mine tailings have waste status it is difficult to change.

Saving the Environment by Being Green with Fintech: exploring the contradictions between environmentalism and reality in the case of Ant Forest

Zeng Zhen

Recent decades have seen an accelerating trend of convergence of capitalism and environmentalism. In August 2016, Ant Financial -the largest Chinese fintech (i.e. financial technology) company -launched a mobile gaming programme called “Ant Forest”, which enables the players to contribute to forestation and conservation projects. It depicts the carbon footprint of the users by tracking their consumption records and reward their low-carbon behaviours through “green energy points” allocations. As their points accumulate to certain levels, the game users can choose to plant a real tree in the China’s remote Gobi area.

By drawing on the technological advantages of fintech, Ant Forest has developed at a dramatic rate. In September 2019, Ant Forest received the Champion of the Earth prize, the UN’s highest environmental award. By the same time, the participants of Ant Forest had amounted to 500 million people and more than 100 million trees had been planted in the real world. In contrast to Ant Forest’s growing social influence and media exposure, however, its rationale and social and ecological impacts remain much under-explored. This research aims at filling this knowledge gap by probing Ant Forest as a dynamic gaming process from the dimensions of game-play (i.e. users), game-structure(i.e. rules) and game-world (background stories) to explore how fintech interweaves with forestation in this programme, and the implications of this convergence on both the participants and the environment.

Drawing on the conceptual framework derived from both the Marxian theories and game studies, this research answers how Ant Forest creates in consistency between the environmental goals and consumption behaviours of the game users. This interdisciplinary study provides an interesting empirical case for discussing and re-thinking the fintech-powered green initiative and the intrinsic logic of capitalist environmentalism, with particular emphasis on the contradictions between its inclusiveness and power inequality, the “green component” and for-profit nature, and the consequent inconsistency reflected on the consumption behaviours and environmentalist mentality of the individual participants.

Exploring Kiertovalu

Tommi Sappinen

Kiertovalu is a Business Finland supported research initiative with Aalto and several parallel company projects. The focus is in foundries, who are currently struggling with their waste moulding sands because of legislative pressure and rising disposal costs. Legislative changes have prohibited the placement of waste foundry sand (WFS) into traditional landfills [1], but its use in earth construction has been made somewhat easier from a legislative perspective through another regulation [2]. Kiertovalu project schedule is from fall 2018 to fall 2020 and aims to optimize the reuse of foundry sands inside the foundry and also make it more practical to utilize used sands in earth construction projects.

The project consists of three work packages. Work package 1 deals with technically sensible ways to use WFS in road construction. The recent decree allows the use of WFS in for example filter layer and some warehouse and field base structures. Since the quality of foundry sands is usually very high, its technical capabilities in construction are being researched further. The most interesting proven use for it is in a mixture with quarry aggregates and secondary raw material based geotechnical binders to make it usable in the load-bearing

structures of roads. This is advantageous also because of the mismatch between low volumes of available WFS and the high volumes of aggregates needed in earth construction projects.

Work package 2 deals with the counterpart of WP1 as it tries to solve the possible environmental risks concerning the use of WFS in earth construction. In most cases, WFS is allowed to be used in construction when the limits for leachates are met according the decree [2]. Since the foundry processes have a lot of variation between themselves, some foundries yet cannot meet these values. For that reason, a possibility to rinse the leachates with rainwater or artificially with mild chemical solvents is studied.

Work package 3 concentrates on thermal reclamation of foundry sands, which is a process to get better quality reclaimed sand for reuse in the moulding process. A recycling facility was set up in Finland just a few years ago [3]and they are now optimizing their process and learning more about the reclamation process. For Kiertovalu, the focus is on studying the potential emission savings from the reclamation process and trying to find out the optimal parameters for high quality reclaimed sand.

Overall, the project has significant capabilities in reducing virgin material usage. The benefits come from two main reasons: reclaiming of sand use in earth construction. For reclaiming, the benefit is that foundries do not need to use as much virgin material in their process. On the other hand the usage of WFS in earth construction lowers virgin material usage for contractors while simultaneously the waste from a foundry goes to beneficial reuse. The project is nearing its end and has given a lot of promising results already. Moving forward the biggest obstacle is making the good results into practice with contractors and municipalities.

References:

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Why is agroforestry not expanding but industrial monocultures are expanding in Brazil?

Markus Kröger and Ossi Ollinaho

Brazil has over 170 million hectares of unused or poorly used agricultural lands, which could easily be turned into agricultural production, or the planting of trees via agroforestry practices. However, such a transformation is not happening, but these lands remain largely unused, for speculative and other reasons, held by unproductive large ranchers, who have an approximate number of one cattle per hectare. There would be no need to deforest anymore forests, if these lands would be put to better use. On the other hand, if this or a deforested land in Brazil is started to be used more intensively, this happens typically for further ranching, soybean, corn, eucalyptus, sugarcane, or mining activities, often illegally or irregularly. It is curious to note that the options which are used for these lands are quite limited to a few industrial sectors, and their technological complexes. Of these, the soybean-corn feed-fuel complex is the most rapidly expanding one, with over 35 million hectares of land occupied, and expanding fast.

This paper utilizes the perceptions from Brazil as a case to explore how productive complexes, and the technologies on which they are based, are not developed based on where it would be most efficient or best to produce what, and based on the best techniques or technologies, that is, in voids free from politics or global

power relations in political economy. This helps to understand how and why certain technological groups and companies, linked to particular economies and states, seem to be dominant in particular regions of the world. This also helps to understand how imagining that for example oil palm, as a more efficient plant in energy-production than soybean or corn for example, could be expanded around the world, is a thinking that is lacking an understanding of real-world politics and realities of what technologies and productive systems can be expanded and where. Technological-productive complexes, such as soybean production machineries, pesticides and fertilizers, infrastructures for export, and production of corn and soybean ethanol, once installed, have their own power. The existence of those existing structures makes it hard to turn over from a path dependency, which drives the expansion to new lands for extractive purposes along the established technological development paths. If these systems get more power, by occupying evermore lands, it becomes ever harder for better technologies, or more suitable plants, or more sustainable and socially just productive systems, such as agroecological agroforestry, to gain hold of the lands close-by. In this way, it is important to not study technologies in a void, but to understand the currently fast expanding and powerful thrust of extractivism and the technologies supporting ever-faster extractive processes. This paper helps to understand how the entities gaining from the sale of these tech developments are unlikely to turn into other, more productive and sustainable technologies, due to their sunk costs, vested interests, acquired knowhow, and other reasons, such as cultural habits and existing arrangements with financing and political power. We will also explore the potential that agroforestry expansion would have in Brazil, through exploration of agroecological agroforestry cases which have shown remarkable success since the 1970s in the Amazon and other Brazilian regions.