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Recovered materials for participatory urban design processes: The case of Struga City

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Abstract

This research aims to show methods of urban design that utilize recovered materials as transformative resources for design. Different materials are available on earth in different states and different usages of said materials can change depending on how architects and designers view them. Different perceptions of findings also give us different urban situations that may be able to change the urban fabric. This process, tested several times in different communities, has resulted positively in the participation of residents as well as in the subsequent maintenance of the transformed space. The projects and experiments conducted below are born from the possibility of recovering materials and reusing them in a new life cycle to ignite urban transformations. Through this process not only do we delay the materials from going into a wasteland but we can also extend their life and their impact on the built environment. Through the process of participatory design, waste materials are recovered and reused as resources for urban interventions.

Keywords

Material waste; city; participatory design; urban design.

I. Introduction

Globally, almost all economic systems rely on the consumption of natural resources to produce economic output and fabricate large amounts of waste as a result (Hebbel, Dirk E.; Winsleska, Martha H.; Heisel, Felix, 2015). While the system itself seems effective, it causes deep environmental burdens to our habitat, and, most importantly, disrupts social integrity and sustainability. An example par-excellence of this phenomena are the images we are offered of the poor living in urban areas, which search for materials among large piles of waste. This symbolizes the clash between two worlds: the overproduction and overconsumption economy we are thriving in, on one part, and the deep social segregation of vulnerable groups on the other. These images coincide with the largest urban agglomerations, where most of the waste is produced, especially non-organic waste. Unfortunately, waste is still majorly treated linearly, by being disposed of in unsanitary landfills, or burnt in incinerators, and is not included in a circular flow of transformation from product to resource.

If we consider the output of these processes in a more general term, we can conclude that it is a 'waste of waste'. Cities produce 1.3 billion tons of solid waste per year, which is expected to grow to 2.2 billion by 2025 (The Economist, 2012).

It comes as no surprise that the countries that produce more waste are the 34 OECD countries¹: indeed, more than the other 164 countries together. China is about to become an outlier in this regard, with statistics estimating that it will produce more than 50% of all global solid waste in the next 5 years². There are two approaches which can address these countries that produce the most waste: either consider them biggest pollutants and an environmental problem, as the traditional point of view; or to look at them under new light: countries with full potential for recycling (Hebbel, Winsleska, Heisel, 2015). This optimistic standpoint asks for a paradigmatic shift in the way we consider garbage and waste.

Although many believe that waste should be valued as a resource. «Waste and its meticulous handling are valued as gifts, offered by society to itself. Where we turn the parable's missed opportunity to our advantage, a modified economy would be set into motion. Perhaps then we would come full circle in being sustained by the constant transformation of matter and energy at hand, without beginning and end» (Angélil & Siress, 2010). They emphasize that waste needs to be considered a gift, rather than a 'negative output'. In the end, it is understandable that waste is considered an investment, which needs to give back value and profit. "So far, this investment is deadlocked and we seem to have lost the key to how to open its potential and benefit from it as a life-long revenue" (Hebbel, Winsleska, Heisel, 2015).

1. Organization for Economic Cooperation and Development.

2. The Economist online, last accessed 29/07/2020.

When the waste is disposed of, as the final output of a production or consumption system, societies need to have access in it through different forms and make revenues from it. But in our economies, the profit from the use of waste once it is disposed of is captured by another subsector of economy. They are other by-products. Problems in our current waste management system have been highlighted by Leonard in several contributions, such as “The Story of Stuff” and “Take, Make, Waste” (2010).

She argues that the current system in which we manage waste is not environmentally unsustainable, because still waste is included in another economic system. The problem is that it is considered as secluded from the initial input system. *«In fact, we follow a linear process where the outcome of our consumption is not valued as a resource but seen as a product excluded from the cycle of our economic system belonging neither to the natural resources nor the desired products»* (Hebbel, Winsleska, Heisel, 2015).

There is a nonsensical allusion to the waste management process: municipalities are paid by citizens to collect and dispose of their waste, thus considering it not as a resource, but rather as a negative by-product. In the US, out of 250 million ton of solid waste produced each year, only about 90 million tons are recycled, while the rest is incinerated or disposed of in landfills (United States Environmental Protection Agency, 2018).

This can be considered a ‘waste of waste’, and influences negatively the whole production cycle: the water consumption, energy, wood or other materials needed to produce the original products, which will turn to waste subsequently. According to Timechange.org, during the production of a plastic bag oil is needed as a base material, and also, in the same amount, as energy during production techniques.

Even more troublesome is the fact that for each plastic bag that is produced, 250 grams of CO₂ are released in the air³. This is a very alarming situation, which can be rapidly improved if the plastic is recycled appropriately. Indeed, almost half of this amount of CO₂ can be contained.

This example takes into consideration one industry, but in other industries, the situation is even more problematic in terms of CO₂ emissions and other toxic gases. For example, recycling steel would save 75% in energy. “And to produce 1 ton of paper, 98 tons of natural resources are needed” (Hebbel, Winsleska, Heisel, 2015). In this context, recycling becomes also the perfect way to efficiently get raw materials that can continuously be reintroduced into the production chain.

3. ‘Plastic bags and plastic bottles – CO₂ emissions during their lifetime’, Timeforchange.org, last accessed on 27/04/2020, http://timeforchange.org/plastic_bags-and-plastic-bottles-CO2-emissions.

2. Related Works

2.1 Urban Mining

Urban mining is a relatively new approach, promoting recycling of materials and components from waste goods or, more extensively, from buildings containing high amounts of useful materials, or at least undesired goods. Ilka and Andreas Ruby explain the current shifting knowledge in their text “Mine the City”, stating that base materials in raw form cannot be found in nature, but rather in more ‘cultural’ milieus, i.e. buildings.

At the sight of their natural roots, the material resources of construction are being rapidly depleted thus accumulating inversely inside buildings. Today, for example, more copper can be found in buildings than on Earth. Our buildings become mines in themselves as mines become increasingly dry. (Ruby, 1989)

The city, in their opinion, must be viewed as a grouping of buildings and mines, much required for its reproduction.

Urban Mining studies and issues of the number of resources that can be recovered in landfills or buildings are blended in Thomas Graedel’s studies. As Graedel puts it, buildings store not just the resources to be recycled, but a huge amount of energy that could be reactivated along with them. He claims that only 5 per cent of the energy originally used for its manufacture is required for the reuse of aluminium that could be recycled from buildings. «Aluminium is extensively employed in buildings, but it does not remain permanently in place. Buildings are remodeled periodically and even deconstructed, thereby freeing the aluminium for recycling. Therefore, it is not inaccurate to regard this aluminium as ‘urban ore’ and cities as ‘urban mines» (Graedel, n.d.).

Urban mining illustrates the ability and possibility of resourcing waste materials by being transformed, reshaped, remodelled, or reconfigured at the end of their first life cycle as they join a second. Dirk E. Hebel in his book Building from waste states that “it also opens up the question of whether the consideration of the waste state of a product should not become the starting point of its design proper” (2015). This clearly shows a different approach from the traditional design process where materiality and its source are introduced through later stages of the design. Open urban landfills, which in most developed nations have been declared illegal during the early 2000s or even before, have been converted to recreational, green space upon their closure. Interestingly, they are experiencing a ‘comeback’ as important suppliers of metals and rare earth, rather than being considered merely waste disposal sites. In 2009, 8.4 billion euro was saved in Germany alone by recycling useful materials from waste goods. It is understated, however, that putting into function former dumpsites has a deep impact on the urban environment. Moreover, it is understandable that many citizens are reluctant to use them, due to possible health hazards caused by a toxic compound, which were isolated previously in many earth layers. It comes as no surprise, therefore, that focus has shifted to buildings, because they serve as a real mine for recovery of materials, especially high-value ones, like copper or aluminium. Indeed, the cost of recycling these materials is lower than the cost needed to demolish these types of buildings. Urban mining illustrates the ability and possibility of resourcing waste materials by being transformed, reshaped, remodelled, or reconfigured at the end of their first life cycle as they join a second. It also lays down the question if the state of the waste product should become the starting line for each new design.



Figure 1

Roma Camp in Tirana where shelters and housing are built from the waste collected from landfills. Photo: L. Plani

Taking into account Maria Voyatzaki (Voyatzaki, February 2016) in *The solid and the liquid in environmental design education*, the environment can and must be appreciated as an innovation catalyst of architectural design; as a framework from which new ideas, forms and immaterialities can emerge offering innovative advancements in architectural contemplation and creation.

2.2 Tirana Urban Bundle

This has been a kind of unconscious process before, where the need for shelter precedes over the quality of materials used to make such shelter. A kind of vernacular approach to building with what the land offers with the main difference is that nowadays the land also offers waste.

The initial life cycle of the product, in this case, is of little concern to the user, with the ability for the product to perform another purpose coming into focus. As the intended purpose falls into the background, geometry and ability of the recovered material to aggregate with other objects become integral. This means seeing any waste from other processes with a potential of serving more than the intended and first life cycle. The definition used by Hebeel during his book *Building from waste on recycling* says: «recycling takes given objects in their context and re-applies them in different contexts and with different functions with little or no physical modifications» (2015).

And while this definition opens up a resource that is presumably worthless to society, this merely welcomes the possibility of tapping into a resource but does not change that resource as applicable to building processes.



Figure 2

Roma Camp near the Center of Tirana (Source: Diagram Authors, Images: Google Maps)

The proposal frames a series of urban guidelines and recommendations to initiate a territorial participative project that could affect the whole neighbourhood.

This methodology was consulted and successfully tested on several other occasions in area and contexts. In this framework, some of the urban participatory design were implemented over the past years during Tirana Architecture Week and Tirana Design Week. Some of this actions are quoted by Ciro and Dajko in “Urban Provocations - Taking Inside Outside (Albania)” (2014) such as Tirana Urban Bundle (TUB), which is a shared area that offers first opportunities for people to participate in the producing and maintaining their own urban space.

TUB is a transparent construction without doors and walls, composed as a particular modular system combining wooden, metal and other recyclable elements. “TUB is a temporary installation in the public space that encourages transparency and facilitates gatherings of the administrators, citizens, investors and experts to maintain their discussions and negotiations on developing Tirana urban conditions” (Dajko, Ciro, 2014).

Another project is called “In the Hood” which was attended by 20 students from Polis University who together with the participation of the residents managed to transform “local scrap material into a temporary installation”. Dajko and Ciro emphasize that: “If you want the cities to offer something for everyone, it is important to engage people in the city-making processes” (Dajko, Ciro, 2014).

In this sense, urban planners have demonstrated a strong interest in communicating with residents in creating a friendly neighbourhood by constructive listening activities and spaces for urban dwellers to express their view of the city’s future (Crewe, 2001)

3. Methodology

The habit of refusing our waste as a possible resource comes as a result of the bad stigma that follows it. On the other hand, recycling data shows that we are passing up on a possible resource that can greatly impact the effect we have on the planet. As our cities continuously grow and expand, more and more of the earth's resources are now found in our built environment. Therefore the process of urban mining (Ruby & Ruby, 2010) comes as a logical solution. Recycling, as stated above, becomes an effective way to get raw materials that can be reused for new purposes and cheap solutions. In this logic, the city itself and its waste become the perfect source or 'mine' where material is collected from new building processes.

The methodology used during this study follows a participatory design approach in urban design that introduces material reuse in order to promote urban design participatory processes. This study works towards the aim of finding ways of engaging the less fortunate communities in improving their public spaces with cheap solutions based on recovered materials. Due to economic difficulties, such communities are much less likely to take action or initiate in improving their social space.

Urban spaces inhabited by these sections of society are often destined to degrade over the years. However participatory design methods adopted before in Albania have proven to be successful in engaging highly divided. Divisions come as the communities are fairly new to each other but also as they have been often lied to from local authorities. As a contribution to this part for Albania, is also the non-profit organization Co-PLAN⁴ who has developed many project in collaboration with communities. One of the recent project was "Performing Democracy: Urban Activism for Civic Democracy"⁵ which addresses the need for the community to take its role and responsibility in city-making process by increasing their participation in the process of conception, design and building.

Another project is the case of 'Qyteti për Qytetaret, Qytetarët për Qytetin' (City for Citizens, Citizens for the City), a design workshop that the authors participated in 2013 and conducted by Elvan Dajko, as a great example of participatory design process involving actors from the community, stakeholders and students of architecture. Their aim was to design an urban playground which utilizes recycled material. Spaces that had been taken over by car parking and completely void of other functions are transformed through participatory design processes in functional spaces for the community.

The experience and outcome of the workshop serve as evidence that local governance involvement is important by making communities dependable. What happens if municipalities are not responsible anymore

4. <http://www.co-plan.org/>

5. More information regarding this project it can be found on the following link : <http://www.co-plan.org/en/demokracia-ne-veprim-aktivizmi-urban-per-demokraci-qytetare/>



Figure 3

In the Hood Workshop Implemented by Co-PLAN, in collaboration with the municipality,
(Source: <http://www.co-plan.org/en/qyteti-per-qytetaret-qytetaret-per-qytetin/>)

for semi-public or public spaces?

The study then shows the case of Struga as a practical example where a participatory design methodology, coupled with material reuse and detached from local governance can be applied. The whole workshop that lasted two weeks was based upon a new law being passed where local governance would not be required to design, maintain or clean semi-public and public spaces for inhabitants. These puts many spaces at risk of degradation over time due to communities being unable economically, or in knowledge on managing their space. A participatory design phase of negotiating with the community and a group of designers to activate transformative processes was applied.

The participatory design phase was framed in a way of understanding the community and its peculiarities to facilitate the process towards the goal:

- Planning short-term and long-term strategies with communities to ensure the effectiveness of the process;
- Giving knowledge and guides to the most involved community members;
- Generating ideas with different ages and groups either through debates, public presentations or craft workshops;
- Identifying key community actors that can be put in charge;
- Letting the community do most of the work as a way for them to take charge;
- Providing them with enough material, information and assistance to continue the process.

Through these two case studies, the paper tries to present an overview of two participatory design processes where local governance takes two completely different roles, one of the main stakeholders, and one where it is not involved at all. Defining the achievable scope in this case completely changes and importance is given to cheap solutions based on material reuse. The important aspect here is to understand how communities can transform and take charge of their own spaces when they are given all the resources possible. By concluding these cases, the study tries to formulate a connection between the urban design participatory processes and using recovered materials as a main resource.

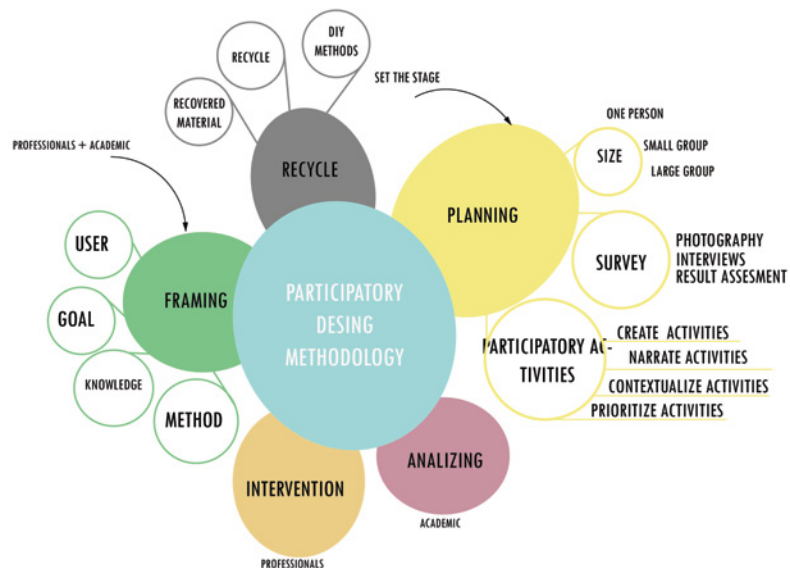


Figure 4
Participatory Design Methodology

4. The case of Struga | North Macedonia

There is no simple solution or one fit all approach to identifying an effective participatory method. UrRe⁶ is born as a project of community involvement in Struga, Macedonia, organized by the EU and organizations such as CreativeActive Struga, EU for You and the Local Development Agency. The workshop is born as a way to promote community engagement in urban design processes especially due to changes in Macedonian law which sees public space ownership passing from the municipalities to neighbourhood administration.

Due to the implementation time and also to a history of neglect even under municipality ownership, the fear that these areas would fall into a process of degradation became real. The workshop aimed at finding a solution and creating a set of operations that can be replicated in different neighbourhoods in Struga. A lack of funding, previous disorganization by local authorities and disbelief between the inhabitants made the task harder. A participatory process was followed during the discussion and design phase to create a sense of ownership and agency in the new spaces.

It quickly became clear that these processes for these neighbourhoods would have no funding with habitats that were directly connected unwilling to pay due to mistrust. This is how the idea of engaging the community in using local recovered materials that they would view as waste became a reality. Waste in this case would imply anything abandoned or seen as worthless in the area.

The workshop below starts from Urban Mining as a way to find the resources needed to understand the underlying qualities of the waste that was “mined” around Struga. Design and solution were thought of only after the participatory process and after having a stock of materials which could be used for the interventions. Therefore, aiming to engage the most marginalized communities especially young people and children, as the sub-category of vulnerable groups, to thrive and involve in active participation of urban life, a combination of a range of complementary participatory methods shall be used. For each phase of the workshop, a specific participatory method was implemented.

- Online Survey and Facebook-based campaign
- Area mapping
- Partnership with the community
- Meeting with the local governance
- Waste collection and categorization / Mining
- Designing
- Child-friendly and participatory Design Process
- Future Recommendations

6. CreativeActive Struga, the organizers held the 2nd workshop of this nature in Struga. More results can be found in the link: <http://creativeactive.org/urre-2-0-urban-shelter/> [last accessed on-line 16.08.2020]

4.1 Material and human resources

Materials gathered through recycling can be of various forms and functions and most importantly can be adapted to fit new uses that the community needs. Simple shipping pallets, collected from markets or shops can be adapted as outdoor furniture through simple woodworking techniques like cutting and assembling. Benches, tables, orchards organizers, fences, bicycle parking, movable platforms etc. can be made through little effort and practical knowledge. Recovered tires which can be found in numerous scrap tire yards, and easily gifted by mechanical shops can be a free solution to be used as space dividers, sitting elements, flower pots, children playgrounds etc. Other materials which can be cheap or provided by the community resources like stones, flowers, paint, beer cases, plastic bottles, bolts and nails can be adapted by the community using DIY techniques to transform the objects and the space to either temporary or final solutions.

5. Results

A workshop for kids was developed where they were asked to design a playground of their dream. On the other hand, a large model was prepared to generate discussion amongst adults concerning specific topics.



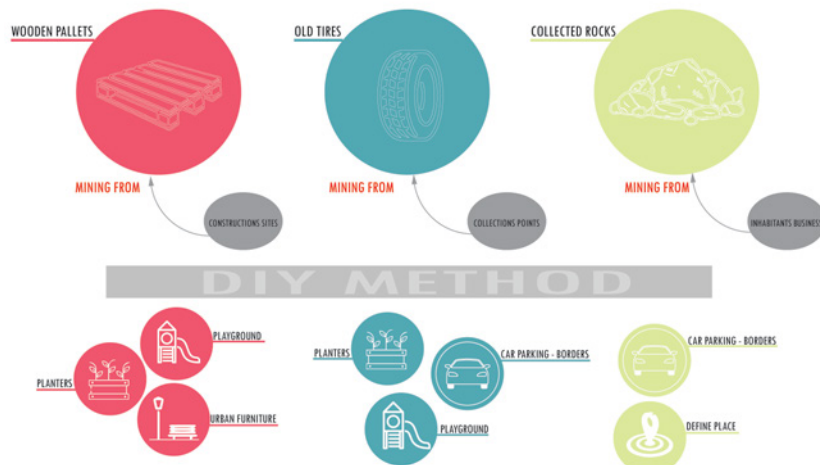


Figure 6

The three main materials collected and transformed into useful urban furniture or elements



Figure 7

Catalogue of actions proposed during the workshop with practical actions taken on site: Creation of Playground through used tires. Credits: North Macedonia UrRe 2.0 Workshop (2018)

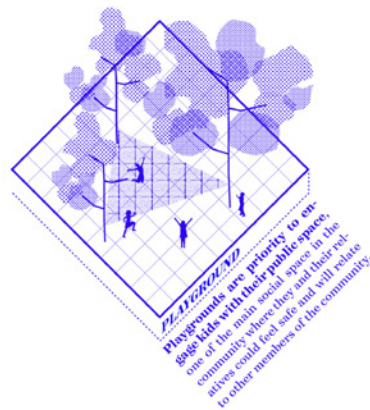


Figure 8

Catalogue of actions proposed during the workshop with practical actions taken on site: Creation of Playground through used tires. Credits: North Macedonia UrRe 2.0 Workshop (2018)

6. Observations

Although no digital tools were used (apart from normal drawing) during the UrRe 2.0 workshop, the challenge of using reusing waste in order to active an urban participatory process proved quite interesting. The final project and intervention were limited to a single neighborhood in Struga. While fairly successful in transforming a space and creating functional urban furniture and design elements, the project was created as a pilot for other public spaces in Struga.

In the interest of our research, the ability to quickly respond to a design problem through the use of 'local waste' shows once again the ability of waste to be a resource when viewed as one. The impact of waste being a dirty, unhealthy and non-sanitary material was easily changeable when habitants were faced with the cost of the shelf products.

They were also quite ready to take part in all parts of the processes, as becoming part of building and making created a different connection between user and space. While the average citizen probably does not have the skills to build or design their furniture, through the use tested designs and support from local experts, these processes can become disseminated in order to be replicated later. Replication of these methods can offer solutions for future neighborhoods which will be required to take charge of the upkeep or even design the future of their own urban spaces.

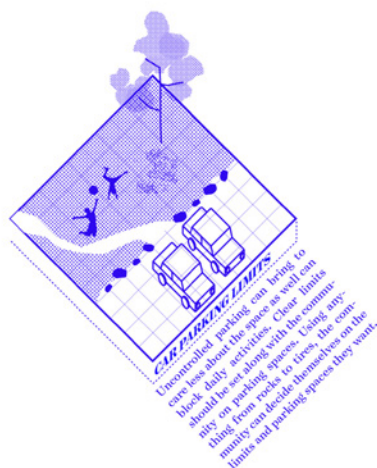


Figure 9

Catalogue of actions proposed during the workshop with practical actions taken on site: Creation of Playground through used tires. Credits: North Macedonia UrRe 2.0 Workshop (2018)

7. Conclusions and future work

Globally, almost all ecThis ongoing research is based on a practical response to an ongoing problem in a particular context. While it is important to mention that the results of the UrRe 2.0 workshop proved quite successful for that context at that time, specifically due to the pass of ownership in public spaces under the new law. Therefore this methodology becomes specific to the conditions and context and cannot be replicated in other communities. In order to allow for an autonomy of future responses in Struga, a publication in the form of a manual was created and distributed to inhabitants and the municipalities with the aim of seeing this processes replicated in future interventions by the citizens of Struga. Although this has yet to be promoted by local municipalities. The participatory processes create a sense of ownership with the space, with locals becoming aware of preserving the new interventions, although it was built out of waste. In this context, we can say that participation plays a large role in processes where citizens are expected to be the main stakeholders.

Further research work will aim toward using digital tools in the stage of the design process. More specifically, helping in the purpose of understanding the main processes where digital tools can become impactful when dealing with waste. In this sense, are used as literal tools that bridge the



gap in the complexity of dealing with materials that do not fall into the standard categorization. The example of the workshop in Struga, on one hand, had very little use for the digital tools as the collection of recovered material was completely based on manual processes, the same as the design. In this context, a research that works on creating more user friendly and top down and bottom up processes can be seen as very useful. The ability of such tools to provide low-cost design services for semi-public



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