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Chapter 10
The Secondary Use Group: Unlocking Waste as a Common Pool of Resources in the 1970s

Piero Medici

Abstract Today, the evident need for more efficient conservation, management and redistribution of natural and human-made common resources have inspired thinkers, researchers, and designers to redefine the organization of our societies. For example, Silke Helfrich and David Bollier argue that the common-pool resources (CPR) defined by Elinor Ostrom require new "practices of commoning" that reconsider the conventional discourses of market economy and state intervention. Several contemporary architectural firms have introduced innovative design strategies concerning the collective collection and reuse of local materials, the commons and the circular economy.

However, already after the oil crisis in the early 1970s, practices like the Secondary Reuse Group (SUG) engaged with circular reuse of materials but did not correlate to discourses concerning the commons. This essay analyzes SUG's projects during the 1970s using a lens calibrated on the contemporary debate of the commons, to unveil and highlight some relevant aspects of their work. This lens will refer to Michel Bauwens and Tom Avermaete who differentiate between material commons, that is, human-made and -handled reserves of materials from our environments and cities; immaterial commons, knowledge and craft skills existing in a particular place; and commoning processes, social practices of mutual collaboration. The first goal of this research is to describe the work of SUG concerning its material and immaterial commons. The second goal is to inform the contemporary debate regarding waste and materials as a CPR to be unlocked by architects and users through commoning processes of materials reuse.

Keywords Commons · Common pool resources · Commoning process · Materials reuse · Circular economy · Architectural approach · Secondary use group · Martin Pawley

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Today, the continuous growth of the world population, the increasing wealth inequality and the depletion of the resources have inspired thinkers, researchers, and designers to redefine the organization of our societies, economic systems and design processes. The need for more efficient conservation, management and redistribution of natural and human-made common resources is evident. For example, the concept of common-pool resources (CPR) described in *Governing the Commons* by Nobel Prize winning political economist Elinor Ostrom (1990), considers our everyday assets beyond the prevailing discourses of market economy and state intervention (Avermaete 2018). In recent years, sociologist, economist and activist Silke Helfrich and activist, writer, and policy strategist David Bollier argued in *Die Welt der Commons* (Bollier and Helfrich 2015) that the CPR requires new "practices of commoning" that challenge our conventional understanding of economy, politics and culture. The British economist Kate Raworth referred to the commons and the circular economy when creating "doughnut economics" (Raworth 2017), Calisto Friant referred to the commons when illustrating the "circular society" (Calisto Friant et al. 2020).

Several contemporary architectural firms are outlining innovative strategies considering the commons, the doughnut economy, the economy for the common goods (Felber 2015) and the circular economy. These practices have introduced architectural approaches concerning the collective collection and reuse of local materials, also for different functions from which they were originally designed. However, practices regarding circular reuse of materials already appeared in the late 1960s and after the oil crisis in the early 1970s (Pawley 1975a). One representative example was the Secondary Use Group (SUG) operating during the 1970s (Kan and Poteliakhoff 1978), when mainstream architecture, academics and intellectuals largely ignored experimental ecologic design (Ingersoll 2012) (Bonnemaison and Macy 2003; Medici 2017). Unfortunately, the design and research of SUG and other similar practices were easily cast aside during the 1980s when the oil price decreased again (Borasi and Zardini 2007). During the 1970s, practices like SUG proposed alternative economic models such as industrial production of materials easy to reuse, but they did not correlate to notions and discourses regarding the commons. It is quite understandable since in 1968, Garrett Hardin wrote that the common resources are tragically exploited when open to all and not regulated (Hardin 1968).

Reading the work of SUG with contemporary knowledge of the commons can unveil and highlight some relevant aspects of their work, which did not emerge sufficiently in the 1970s and the 1980s. For example, several years after the 1980s, Helfrich stated that a CPR becomes a commons only when communities use and sustain it (Helfrich 2011). Belgian political theorist Michel Bauwens further elaborates on the CPR, differentiating "material" commons as reserves of materials, and "immaterial" commons as knowledge and skills (Bauwens 2017; Bollier and Helfrich 2015). Belgian architectural scholar Tom Avermaete distinguishes among "res communis" as materials commons, "lex communis" as common codes and norms, and "praxis communis" as collaborative practices (Avermaete 2018).

In this essay I analyze the projects of SUG during the 1970s using a lens calibrated on the contemporary debate of the commons. Through this lens, I examine

some crucial aspects of the projects, like the CPR composed of waste such as used industrial products. In this case waste represents material commons and res communis, converted into new objects, buildings, and spaces in the city. Architects and users then unlocked the CPR through immaterial commons, lex communis and praxis communis. For example, SUG defined a strategy for the collection and reuse of local second-hand materials related to the distance from the building site; they embraced do-it-yourself construction with technologies such as solar panels, rainwater collectors and greenhouses integrated into their buildings. SUG designed and crafted external cladding from used food cans, and floors and walls built from beer crates as a structure and shredded paper as insulation (Pawley 1975c). With the collaboration of some students, SUG tested structural beams composed of cut cans, and they reused sections of pipes as shelves for a shop (Kan and Poteliakhoff 1978).

The first goal of this research is to illustrate the work of SUG concerning its immaterial commons as design methods, referring to the British architect and researcher Martin Pawley, who taught, researched and published about reuse in the 1960s and 1970s. The second goal is to inform the contemporary debate regarding waste and materials as a CPR to be unlocked by architects and users through lex communis and praxis communis of reusing materials also for a different function than they were originally designed for.

This research has employed two methods to achieve the research goals: literature review explained in Section One and Two and case study in sections from Three to Eight. With the title *The 1970s as a Forge of New Concepts Concerning Common Resources*, Section One gives an overview of the literature throughout the 1970s regarding the commons, the bottom-up participative, and cooperative processes. Section Two, entitled *Contemporary Discourses of Urban Commons*, explains the concepts of CPR, lex communis, praxis communis, and other literature concerning the commons developed after the 1970s. The first two sections define the main theoretical elements used to calibrate the lens adopted in this essay to read the SUG works. Section Three illustrates the work of Martin Pawley, which is the primary reference of the architects composing the SUG. Section Four to Eight then analyse SUG's works through a series of lenses calibrated by the literature view, such as collaborative practices, the CPR, praxis and lexis communis.

1 The 1970s as a Forge of New Concepts Concerning Common Resources

At the end of the 1960s and the beginning of the 1970s, prior to the 1973 global oil crisis, different literature introduced new economic and social approaches regarding natural and human-made resources. On the one hand, discourses emphasizing direct participation and citizen inclusion often through mechanisms of bottom-up governance were described in a number of influential publications: *Limits to Growth* by Donella Meadows and others (Meadows et al. 1972), *The Entropy Law and the*

Economic Process by Nicolas Georgescu Roegen (1971), *The Closing Circle* by Barry Commoner (1971), *Post-Scarcity Anarchism* by Murray Bookchin (1971), *Small is Beautiful* by Ernst Friedrich Schumacher (1973) and *Tools for Conviviality* by Ivan Illich (1973). On the other hand, texts such as the renowned *The Tragedy of the Commons* by Garrett Hardin (1968) and *The Population Bomb* by Paul R. Ehrlich (1968) advocated population control and resource efficiency strategies from the top down.

In this context, literature concerning architecture and design reacted through texts like *Design for the Real World* by Victor Papanek (1971), Charles Jencks and Nathan Silver's *Adhocism: The Case for Improvisation* (1972), *The Alternative: Communal Life in America* by William Hedgepeth (1970) and Peter Cook's *Experimental Architecture* (1970), to mention some. In 1971 and 1973, *Architectural Design* magazine devoted two covers to "garbage housing", also the subject of English critic Martin Pawley's book *Garbage Housing* (1975a). In the book Pawley published the research carried out with his students at the Architectural Association (AA) in London and the School of Architecture at Cornell University (Ponte 2006). The magazines also described the work of SUG, mentioned in Pawley's book as well. They were a group of British architects, former students of Pawley at AA and mainly active in London, who reused second-hand materials to build housing prototypes and interiors.

Pawley and the group described their work, mainly focusing on technical aspects regarding reused materials and construction details, contributing to solving the housing crisis. They did not center the discourse on sharing the common resources through design and cooperative processes, which is quite understandable since the commons had recently been described as a tragedy by Hardin. Nor did they highlight the importance of the collective and cooperative aspects of their work relating, for instance, to concepts described in *Tools for Conviviality* such as autonomous and creative intercourses among persons and their environment (Illich 1973). Against this background, in this essay I will read the work of SUG and Pawley through the knowledge developed about the commons after the 1970s. I will draw on some of the sources mentioned above including the titles advocating bottom-up participative and inclusive processes and more recent literature concentrated on the commons in urban territories.

2 Contemporary Discourses of Urban Commons

Concerning the concept CPR (Ostrom 1990), which this essay takes as a reference, Ostrom maintains that these common-pool resources can be found in the environment and consist, in the first place, of a "resource system" such as groundwater basins, grazing areas, fishing grounds, irrigation canals and bridges. Secondly, they are composed by "resource units" which entail the "water withdrawn from a groundwater basin or an irrigation canal, fish harvested from a fishing ground, the fodder consumed by animals from a grazing area" (Ostrom 1990, 30). Ostrom claims that

the common-pool resource system and unit maintain a reciprocal relationship that needs to be governed and regulated (Avermaete 2018).

Silke Helfrich states that a CPR becomes a commons only when it is turned into a commons by its users; when communities use and sustain it (2011). Michel Bauwens further elaborates on the CPR to be found in urban territories. He differentiates between inherited commons which he links to resources such as earth, water, and forests; material commons such as human-made and human-handled reserves of materials from environments, and immaterial commons such as the intellectual and cultural knowledge and craft skills existing in a particular place (Bauwens 2017; Bollier and Helfrich 2015). From this perspective, cities can be looked upon as a stock of materials that is constantly used and reused, and where waste materials can be considered both a stock of material resources and a potential CPR, prevalent with contemporary professionals engaging with reuse and sustainability (Avermaete 2018).

In recent years, Tom Avermaete has focused on the architecture of the city as "one of the main tangible forms in which the commons exist in society" (2018, 33). Avermaete explores how conceptions of the commons have been part of the development of the architecture of the city, distinguishing among "res communis" as CPR stocked in the city (2018); "lex communis" as common codes and conventions and norms of art posed by architecture (Avermaete 2018); and "praxis communis" as social practices of mutual collaboration, support, negotiation, communication and experimentation that are needed to create systems to manage CPR and to engage with common codes and conventions (Avermaete 2018). Concerning the process of commoning, David Bollier argues that in a commons, care work (2020), also defined affective labor by geographer Neera Singh (2013), has primary importance. However, market systems like capitalism consider labor as mainly motivated by monetary reward and usually ignore the care economy characterized by social conviviality that is essential for a stable, sane, rewarding life (Avermaete 2018). In this essay, while analyzing the work of SUG, I will refer to the Bauwens material and immaterial commons, definitions that are related to Avermaete's res communis and lex communis. I will also refer to the concept of the commoning process, which relates to praxis communis. The goal will be to read the work of SUG in particular and the concept of waste and design as a commons in general, using a lens calibrated towards contemporary discourses about the commons.

3 Martin Pawley, Waste Materials Reused to Build Houses

Martin Pawley was the founding editor of the London-based Architectural Association (AA) School's weekly newssheet *Ghost Dance Times* (1975b), and author of several articles and books including *Garbage Housing* (Pawley 1975a). In his publications, he does not directly address the topic of the waste as a common resource to share and to use through cooperative, bottom-up processes, similar to the processes of commoning. He is critical towards linear processes of production,

consumption and disposal of materials and in favor of introducing recycling and reuse strategies to improve the efficiency of industrial cycles. However, he does not significantly promote practices of cooperative, bottom-up initiatives regarding reuse and collection of waste materials. Even if not deliberately, Pawley highlights the potential of waste materials as a CPR, and he describes first steps of possible immaterial commons and commoning processes.

In the *Architectural Design* issues of 1971 and 1973 (Pawley 1971; Pawley 1973), he discusses ideas that would later form part of his book *Garbage Housing* published two years later. In this book, he calls for better use of waste and secondhand materials, for affordable housing "built from the detritus of a society of conspicuous consumption" (Pawley 1975a). Pawley focuses on the shortage of houses in the UK, the expensive and lengthy processes of construction, especially compared to industrial consumption products such as bottles, televisions and cars. He describes examples of material reuse in the work of his students and in different practices, also briefly mentioning the work of SUG. He refers to some examples including the WOBO (World Bottle) project by the Heineken corporation, where beer bottles designed in the shape of bricks are reused as a construction material for housing (Pawley 1975a). Pawley tends to concentrate on topics such as cost, materials and industrial production; social and behavioral issues only form a tangential part of his work. He maintains that technology at the time was a linear process, which consumes raw materials to generate products which then become waste. The recycling of waste materials was unusual, expensive and time-consuming, with waste from industrial production causing problems like chemical, visual and noise pollution, and workers striking due to unhealthy working conditions. Pawley thus signals the need for converting industrial waste material into secondary use, to treat it as a new raw material for other processes, including housing (Pawley 1971).

In the last pages of the book, he mentions the student work of Shiu-Kay Kan, one of the future members of SUG. In 1973, at the Central London Polytechnic (PCL), Kan built some metal structures assembled from spot-welded catering cans. The structures could sustain the minimum dwelling unit designed by Kan at the school, in the following year. Kan's four by three-and-a-half meter enclosure used a raised floor of beer crates with welded-can wall units and Masonite cladding. The design incorporated aluminum solar heating panels developed at PCL (Pawley 1975a). The minimum dwelling unit, an open space with kitchen, bathroom, bed and desk, could be suitable as a temporary dwelling for students. Pawley then proposes a garbage housing project for a few hundred students, self-built, self-designed and self-administered by the students with some support from manufacturers and the approval by the local authorities The goal of the project is to contribute to further developing the secondary use of materials discipline and to extend its implementation scale. Pawley identifies a student housing crisis in most of the British universities, both in terms of shortage of available housing and of cost. He explains that students, a social group still outside the spiral of consumption, would build their own dwellings. His suggestion is to locate the garbage housing on the large areas of the abandoned, unmaintained, unused urban waste land available for a minimum of two years during the cycle of redevelopment. Pawley considers the unused land,

which could be leased by the owners, the local authorities, and the labor force of students willing to build their own housing, a winning combination. In addition, he considers short-life garbage housing settlements rotating around redevelopment sites on two-yearly cycles with the expertise from the students of architecture, design and engineering, as a first step to implement secondary use on a bigger scale (Pawley 1975a).

Pawley does not directly refer to notions about the commons nor cooperative, collective and communal practices. However, he claims that the second life of materials is indeed a resource essentially not used despite its great potential. Although not emphasized by Pawley, *Garbage Housing* illustrates several elements related to the notion of immaterial commons, such as the skills and the knowledge needed to use waste as a resource, and the DIY skills of the students cutting, welding and connecting parts of cans and beer crates. Pawley's idea about the garbage dwellings for students has many features of a commoning process. The waste materials as a CPR would be used by the community of students to build their own houses. The originally unused urban area would then host a community of student dwellings with the potential of accommodating more functions. The students would share knowledge, craft skills, codes and norms posed by architecture regarding the collection of the materials and the construction of the houses as immaterial commons. Furthermore, the minimum dwelling unit would be provided with solar panels developed at PCL. Students and researchers of the community would also be able to share knowledge about these technologies regarding the possible partial autonomy from the energy grid. The described social practices of mutual collaboration, support, negotiation, communication and experimentation between students, researchers, local authorities and manufacturers would be needed to create a system to manage waste as a CPR and to engage with craft skills, architectural codes and norms (Avermaete 2018).

4 A First Attempt to Reuse Urban Waste

In 1975 Pawley wrote again in *Architectural Design* about a small house in London designed and built by architects Shul-Kay Kan (no longer a student) and Michael Poteliakhoff (Pawley 1975c). Pawley this time does not describe an academic or a corporate research project but a real built one, even if a prototype (Figs. 10.1 and 10.2). From the description of the project and the design process, some more details emerge concerning the notion of the commons. Pawley explains that the project was born in 1973, designed originally by Kan during a period at the Architectural Association School (AA) in London, where Pawley was working. The spot-welding techniques of the tin cans were developed with the assistance of the technical staff in the PCL technical laboratories. He explains that both the designers had been students of architecture at PCL. Together, they presented the house structure as part of their final year portfolio, and together with Andy Robson they belonged to the practice called SUG (Pawley 1975c). Their intention was to explore to what extent it was

Fig. 10.1 Small house in London, SUG, details from the inside and the outside of the reused tin-can wall, tin-can structural beam, reused tin cans filled with shredded paper, and location of the house in the backyard. (Source: Kan and Poteliakhoff 1975)

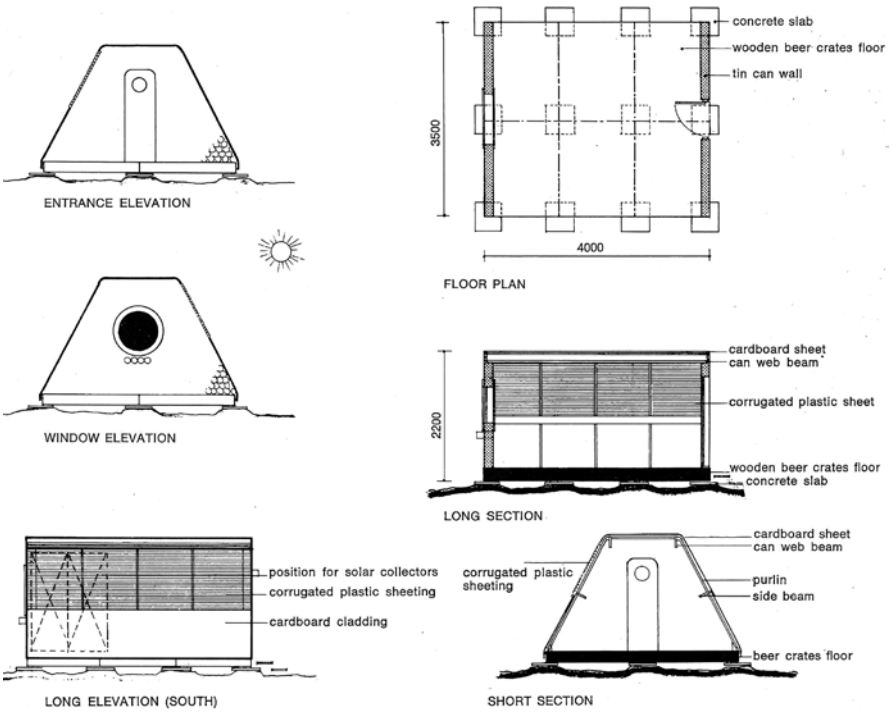

Fig. 10.2 Small house in London, SUG, elevations, plan, section. (Source: Kan and Poteliakhoff 1975)

possible to make practical use of cardboard, paper, wood, metal or plastic waste, which in any city are disposed daily in enormous quantities (Kan and Poteliakhoff 1975).

In this article, Pawley not only describes in detail how the house is constructed but also mentions where and how the materials are collected. He notes that the two end walls of the small house are made of used food cans collected from locations such as restaurants, bars and canteens (Fig. 10.3). The insulation is provided by shredded paper from office refuse, placed inside the cans. The floor is composed of beer crates and it rests on pieces of damaged cement slabs retrieved from building sites. The beer crates are donated by the British company Watneys and are connected with can lids that are nailed over four corner junctions (Pawley 1975c). The outer shell is constructed from a corrugated plastic sheet, which is damaged and therefore low in cost. The interior cladding is realized with packing case cardboard (Pawley 1975c). The cans – welded together and given a lightweight cement infill – are collected from local businesses, starting with a Chinese restaurant nearby. After persuading some chefs and businesses owners, the tin cans came in at the rate of 200 per week.

The harvesting of used materials is a relevant aspect of their work in the context of commons. Pawley mentions several locations where the cans are collected, such

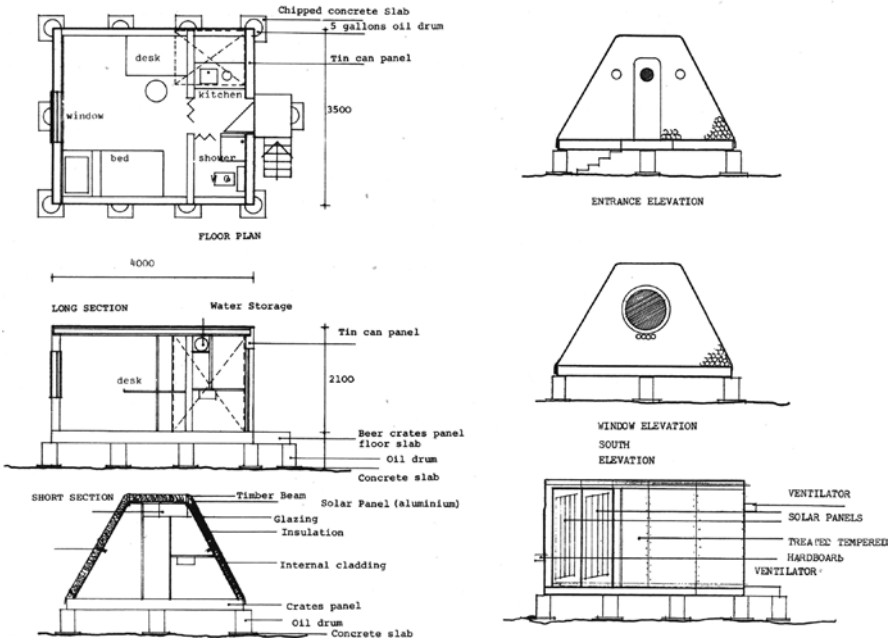

Fig. 10.3 Small house in London, SUG, elevations, plan, section. (Source: Pawley 1975a)

as restaurants, offices and businesses; and also describes the group's negotiations with some providers of materials; other materials were received as a gift. Waste, in this case, can be considered as taking a step towards becoming a CPR, since more community actors are taking part in the process. SUG collect the waste to reuse in the project, saving the businesses the work of disposing of it. Furthermore, the knowledge and craft skills acquired by SUG in operating with waste materials – in terms of negotiations, communication, mediation, explanation of the innovative practice to businesses, collection, design and manufacturing – can be regarded as immaterial commons.

In the same article, Pawley adds an explanation about the design and the construction process and the different tasks of the two architects. Kan designed a prefabricated wall section system for the two end walls of the house, storing the spot-welded sections ready for site assembly. Poteliakhoff designed a composite lattice beam using flattened cans as spacers between thin timber planks. The walls built by Kan were assembled and connected through the beams designed by Poteliakhoff. The roof consisted partly of tri-wall cardboard, partly of Masonite, partly of damaged and therefore cheap corrugated plastic sheeting. The latter was lapped on the side in order to mask its damage. The roof was seam-sealed with Sylglas and waterproofed with yacht varnish. Pawley says that the house "possessed … evident strength and promising durability" (1975c, 699). The house was only 14 m^2, the minimum dwelling unit, and it was built on a private back garden in

Holloway, London. The article also relates some particulars about the design process, specifically two false starts during the assembly phase: the first selected building site had to be changed because the owners complained. In the second chosen site, the Crumbles Adventure Playground in Islington, London, some youngsters set fire to the project during the construction phase. The project was completed at the third site in Holloway, London. Pawley specifies that the transportation, due to the site changes, increased the total cost up to approximately five British pounds for square meter, which was still very affordable compared to the standard housing of the time (Pawley 1975c).

In this case, we see a missed opportunity of commoning process. Due to a lack of mutual collaboration, support, negotiation and communication, the local actors not only did not cooperate in the collection of materials, construction and use of the house but also complained about the project, and they even burned down the first house. Some other notions also emerge from the Pawley's article. In the construction of this house, several materials are reused for a different function than they were initially designed for, and sometimes transformed before being reused. They are reused both for cladding and for structural purposes. In the latter case, they usually need a higher degree of manufacturing. The tin cans composing the walls, for instance, are welded together and linked with a light concrete infill. Most of the materials used are reclaimed. Only some materials are new, such as the concrete slabs, or the wooden part of the tin-can beam. The reused materials are cut, drilled, flattened and reused as walls, floors and structure. For instance, the tin cans are cut, painted and welded together; at first glance, they might appear familiar. Nevertheless, only close observation of the tin-can wall and construction details makes it possible to detect that the objects that compose the wall are well-known. This constitutes an innovative aesthetic value: the experience of slowly rediscovering a familiar object reused unexpectedly. This aesthetic feature can be related to the concept of commons aesthetics discussed by urbanist Adam Greenfield and urban sociology researcher John Bingham-Hall referring to contemporary urban spaces usually not governed by either the market or the state, characterized by the use of low-cost, reclaimed materials and DIY construction (Greenfield 2018; Bingham-Hall 2016). From this perspective, the house in Holloway could be considered an innovative precursor of and reference for a contemporary commons aesthetics found for example in urban projects such as R-Urban in Paris and Institut for (X) in Aarhus (Greenfield 2018).

From an architectural perspective related to the adaptable use of space, the trapezoidal walls supported by the tin-can beam allows for the realization of flexible open space. It can be used as a shelter or as a greenhouse because of the translucent southern façade. Part of it can also be opened as a window. In effect, the translucent plastic sheets on the south side permit the access of natural light. Even if in this case the house does not incorporate a greenhouse for food production, the house itself has a similar structure and some features of a greenhouse. It is in effect a semi-transparent unique space with the southern wall inclined towards the sun. Because of the trapezoidal shape of the house, one of its two long façades can support solar panels. The possible location of solar panels is drawn with a dashed line on the

southern elevation. In this case, the solar collectors would obscure only one third of the southern façade, leaving the remaining two thirds of the façade open to natural light access and a view towards the outside.

Compared to the design of the house developed at the university two years earlier, some minor differences emerge. The houses are very similar in terms of dimensions, structure and shape. In the real house SUG did not build the bathroom and the kitchen. The design shows the solar panels on the southern façade completely covered by treated tempered hardboard. In the real shelter, half of the surface of the southern façade is translucent with corrugated plastic sheeting. Judging from the pictures, the building seems to have been used, at least temporarily, as a greenhouse with some plants inside, and as a tool shed. The similarity of the shelter to a greenhouse and the explicit indication of the location of the solar collectors suggest that even if the house does not have energy and food autonomy as a declared goal, it represents a design concept in favor of at least partially disconnecting from national grid services. From this perspective is worth citing a thinker about the commons like David Bollier, who maintains that "rather than look[ing] to state authorities as guarantors or administrators of their interests, commoners generally prefer to seek direct sovereignty and control over spheres of life that matter to them: their cities, neighborhoods, food, water, land, information, infrastructure" (Bollier 2020).

5 The Operation of Harvesting Materials as Immaterial Commons

Three years later, *Architectural Design* further illustrated the work of SUG. The magazine, which on the first page welcomes unsolicited manuscripts and other material for publication, does not specify the author of the article. It seems safe to assume that someone from SUG at least contributed to the writing. The article, which explains how waste was managed in the UK at the time, gives an insight into the SUG strategy of material collection and describes four of the group's projects: a two-person dwelling, a further development of the structural beam, a demountable greenhouse and an installation inside a shop (Kan and Poteliakhoff 1978). From these works, illustrated in detail in the article, several aspects regarding the commons can be outlined.

The article emphasizes that at the time in the UK, the amount of waste materials reused by the construction sector was meagre. Buyers of recycled waste were discouraged because though the materials were often damaged or of low quality, they were still quite expensive. Moreover, at the time costs were rising for new standard building materials too. The article observes that in a time of crisis, with high unemployment, new jobs could be generated by a newly organized re-use industry, which could also satisfy the increasing demand for urban renewal. The article goes further, proposing a strategy that entails the design of objects and packaging with a reuse afterlife in building construction planned beforehand. An example of this is

replacing one year's production of bricks with recycled bottles designed with a specific shape in order to be reused as bricks (Pawley 1975a). However, the article recognizes that the implementation of such objects with second use planned beforehand would encounter some difficulties. First, because they would be more expensive to produce compared to standard bottles. Secondly, they would need to be incorporated in traditional construction processes and to be weather-proof. The presence of many kinds of standard garbage would require a strategy to make better use of it.

The article maintains that SUG assesses the feasibility of reuse depending on the distance between the source of waste materials and the actual place of use. According to their study, if the distance is greater than 20 kilometers, it was unlikely to be cost-effective in the UK at the time. This assessment is probably related to what is intended by the so-called economic radius (Kan and Poteliakhoff 1978) in the diagram below (Fig. 10.4). The image is a map realized by SUG showing the distance of the materials to be collected around the city (1), processed in the workshop (2) and assembled at the building site (3). The building site is represented with a sketch of the SUG two-person dwelling project. The diagram can be used as a tool to collect materials and a map with which to estimate and trace where the materials are located and if it is worth reclaiming them in terms of time and costs. Distances up to 50 kilometers are indicated on the diagram.

Knowledge of the collection, storage and remanufacturing of materials to be ready for use can be defined as an immaterial commons, in the sense of locally specific knowledge and craft skills. In this case, too, the article attends to technical details related to distances and logistical costs. Unfortunately, not much is explained about the even more interesting actions and possible commoning processes such as the operation of collecting the materials through cooperation or negotiations with the materials providers. Nevertheless, the map designed by SUG traces an innovative representation of the building site and logistics and manufacture of materials. The source of waste materials, the workshop where materials are manufactured and

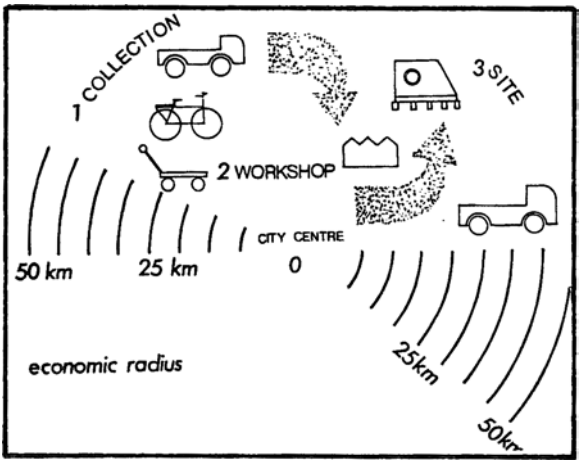

Fig. 10.4 Diagram representing the reused materials process and the distances from the city center, SUG. (Source: Kan and Poteliakhoff 1978)

stored, and the building site are all within a maximum 50-kilometer radius, but generally closer to 20 kilometers. The collection of materials is again at the center of the architectural design. The common resource of waste is represented in its potential and its importance related to the context. The map shows the different phases (1, 2, 3) where possible commoning processes and new jobs, could materialize. SUG, relying on their own knowledge, but also by communicating with local businesses and actors, has drawn an additional layer on the map of part of the city, indicating the location of a valuable common resource. Furthermore, they have transformed the design and construction process from linear to circular, sourcing locally available materials, designing, storing the building components, assembling on site and eventually disassembling again.

6 Two-Person Dwelling and a Greenhouse

In 1977, architects Shiu-Kay Kan, Mike Merhemitch, Michael Poteliakhoff and Andy Hobson from an expanded Secondary Use Group, designed a two-person dwelling (Kan 1978; Kan and Poteliakhoff 1978). The structure consultant was Jime Tyne (Kan 1978) (Figs. 10.5, 10.6, 10.7, 10.8, and 10.9). This project was derived from an experiment where a structure was erected composed of external walls of the same type as their first house built in 1975. A further development of the

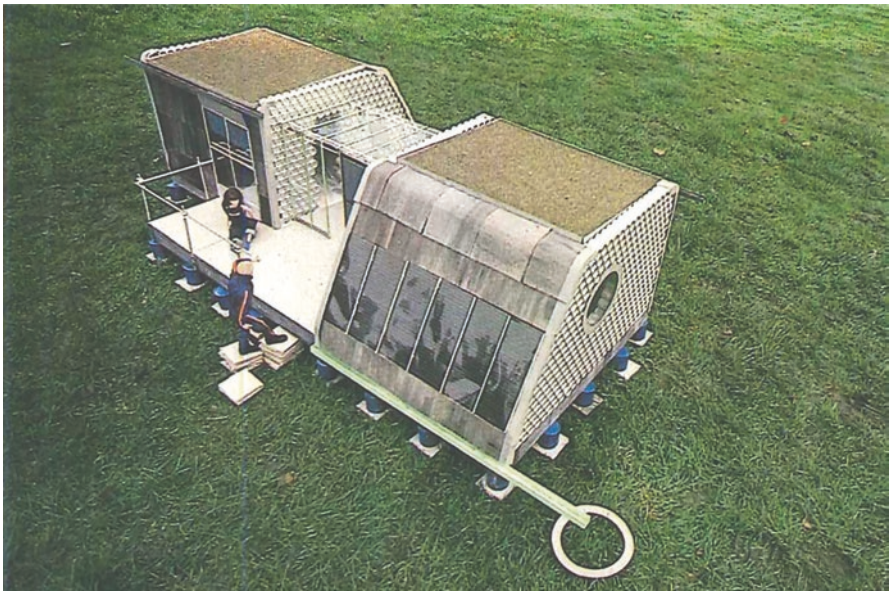

Fig. 10.5 Two-person dwelling, SUG, south-east side, pending wall with solar collectors. (Source: Kan 1978)

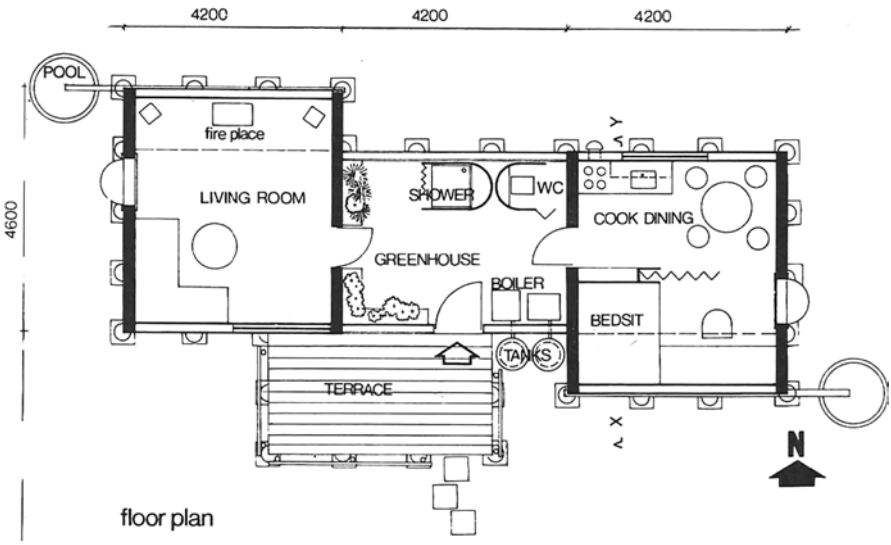

Fig. 10.6 Two-person dwelling, SUG; ground floor plan; the greenhouse in the middle is also the entrance, containing shower, toilet and boiler. (Source: Kan and Poteliakhoff 1978)

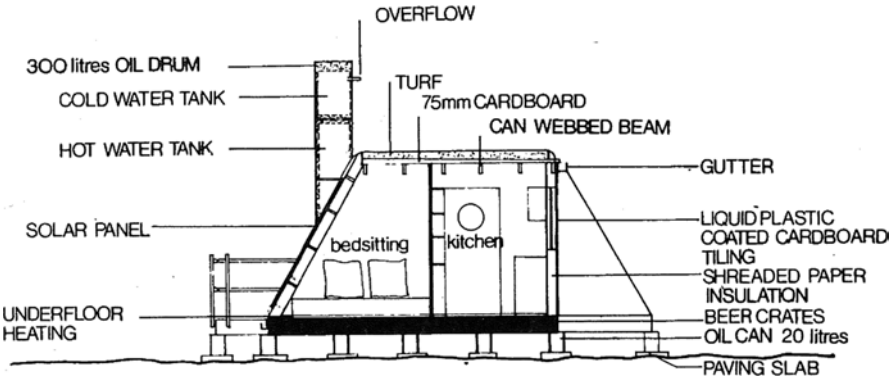

Fig. 10.7 Two-person dwelling, SUG, section along the eastern volume. (Source: Kan and Poteliakhoff 1978)

structural beam applied to the first house was used in this second house as well: the four-meter tin-can beam was tested at PCL (Kan and Poteliakhoff 1978). The two-person dwelling architecturally consists of two identical units, one for living and the other for sleeping. The units are alternatively positioned and their dimensions are 4 × 4.2 × 2.3 m. A glazed area acting as an acoustic barrier that accommodates a toilet, a shower and a greenhouse connects the units. The southern pitch roof has an inclination of 60 degrees and it has a solar collector installed. The other vertical wall with a double-glazed window allows the sunlight to penetrate into the living area.

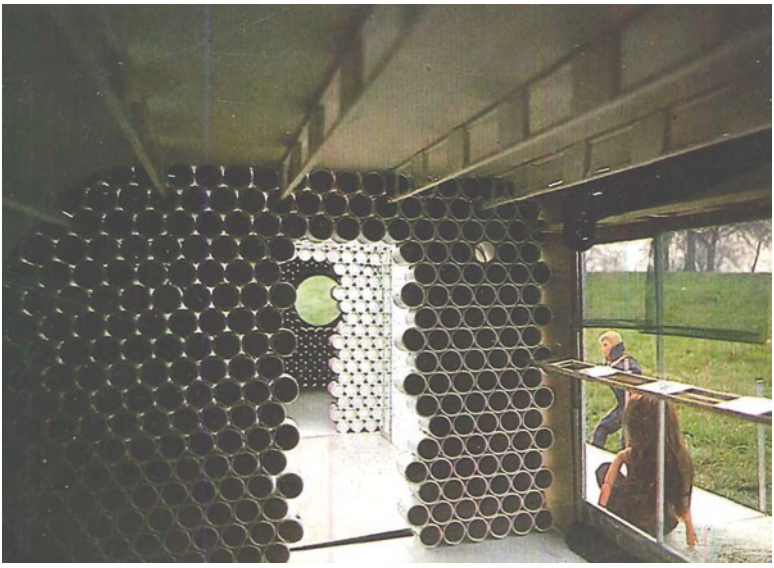

Fig. 10.8 Two-person dwelling, SUG, view of the living room area, tin-can wall and beams. (Source: Kan 1978)

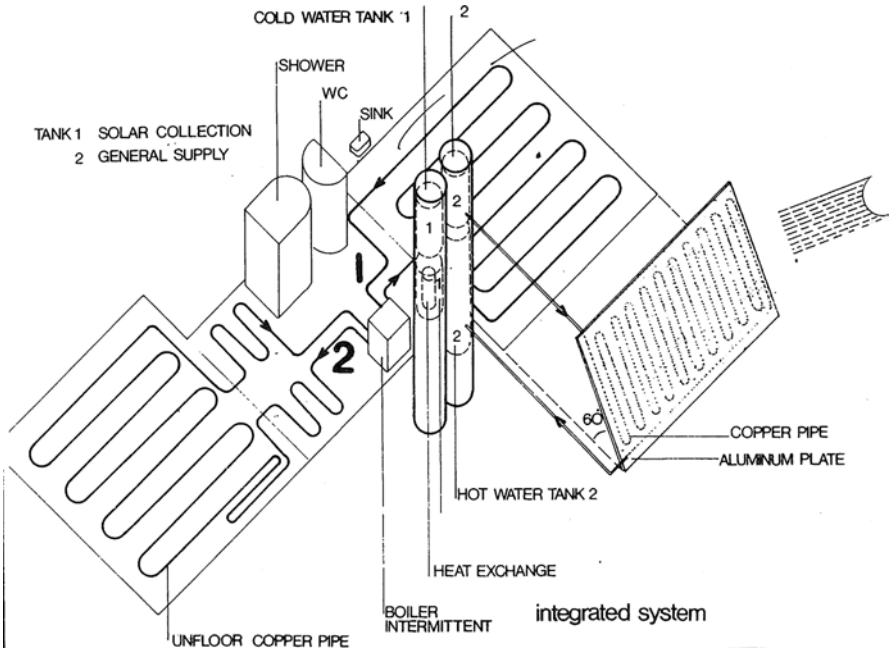

Fig. 10.9 Two-person dwelling, SUG, Integrated system. (Source: Kan 1978)

The article describes the simple construction of the building and how the components prefabricated in portable sections could be transported and assembled on site by two workers. Most of the building materials are recycled. The floor panels are made from wooden beer crates jointed together. They are lifted up by 20-liter oil drums and paving slabs. The tin can webbed beam is four meters long and rests on a spot-welded wall at 600 mm intervals. The external cladding is a plastic-coated cardboard sandwich panel while the rooftop is 100 mm thick turf, drained towards the vertical side of the wall. The rainwater is channeled into little pools and the water is stored for gardening during dry periods. SUG predicts that if the walls are painted and looked after yearly, the building could last for 15 years. The total cost of the materials and the transportation on the site are around 500 British pounds. This amount includes a solar central heating system, but excludes labor (Kan 1978).

The architectural composition of the house consists of two volumes connected by a greenhouse. The greenhouse also serves as the entrance and contains the shower, the toilet and some technical installations like the boiler. Apart from the greenhouse area, the living room has a window facing south and the bedroom has a window facing west. The solar collectors for water heating are embedded in the southern wall of the building volume containing the bedroom and the kitchen. This example represents the paradox of catching the solar light with solar collectors, which block the view towards the outside and the access of natural light from the south. In this case the compromise was to place the solar collectors only on one of the two building volumes. This house with greenhouse, solar panels, and rainwater collection moves towards an alternative economic and social model. The use of waste materials and the social practices and behavior of the inhabitants allow the house to become the tool to unlock rainwater and solar energy as a common resource to produce energy and grow food. The building could, for example, fit perfectly in the commoning process of student housing on urban waste land described by Pawley in *Garbage Housing*.

The article does not extensively describe the detailed role of the various actors involved in the processes of collection, storage and manufacturing of the various components. Since the house was still a prototype, not much can be said about the client, stakeholders and the users of the house. However, social practices of mutual collaboration between the members of SUG, the materials providers, PCL and the structure consultant (even if it is not clear if they were voluntarily helping or hired) could all be considered part of commoning processes. Also, in this case, waste can be considered a CPR since it is used and sustained by the small community composed of SUG, the materials providers and the few other actors involved in building the prototype. As an example, the prototype could become part of student housing, built by the inhabitants as in the project described by Pawley in Garbage Housing; in this case, the social practices of mutual collaboration, negotiations, communications and experimentation would not only focus on waste materials but also energy and food.

SUG also built a demountable greenhouse (Fig. 10.10). Shiu Kay Kan, Michael Potehakhoff, Mick Merhemitch, Andy Hobson and Melanie Sainsbury participated in the project. The tin cans were once again the main reused material but this time

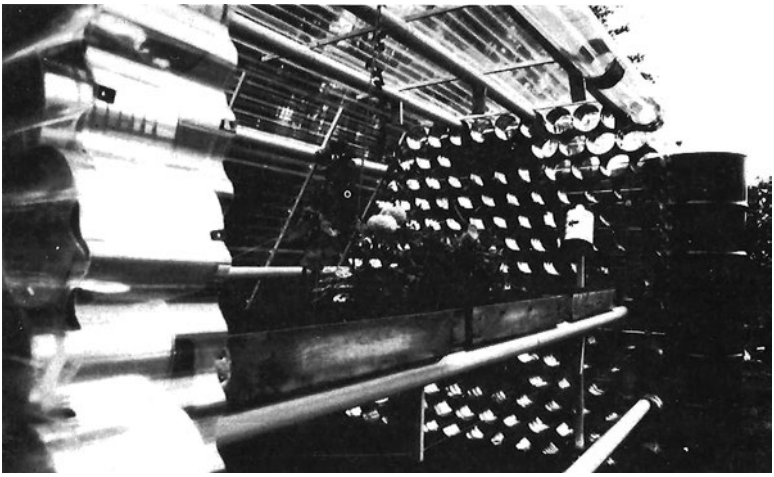

Fig. 10.10 Demountable greenhouse, SUG. (Source: Kan and Poteliakhoff 1978)

the construction method was slightly different. The group explains that the cans opened at both ends, could be linked by 'spike' clips which could be easily purchased at most auto parts suppliers. The greenhouse was built using this method for the cross walls while the beams were made from cardboard tubes with a tensioning system made of wire. The article explains that the structure was clad entirely with reused corrugated plastic sheeting while discarded commercial bread trays were reused as plant boxes and the cans on the walls were used for tool storage. The greenhouse was successfully dismounted on two occasions for transportation and the project was also presented twice on BBC television (Kan and Poteliakhoff 1978). Analyzing the pictures, the greenhouse has a similar shape to one of the units of the two-person dwelling. This greenhouse shows the interest of the group in autonomy intended as self-reliance in terms of energy and food. In the TV broadcast, the group tries to spread to a broad public their immaterial commons like their intellectual and cultural knowledge, craft skills, and collaborative DIY practice.

7 Waste as a Resource for Interior Design

SUG applied the same method of second-hand materials reuse to interior design. The article in *Architectural Design* also describes a Christmas décor realized for a shop in Milan by Shiu Kay Kan, Mick Merhemitch and Andy Hobson (Fig. 10.11) (Kan and Poteliakhoff 1978). The client required a highly decorative quality for the display shelves. Moreover, the design had to be flexible in order to suit a large variety of clothes and jewelry. The group could rely on an Italian can manufacturer who generously collaborated on realizing the installation. The Italian company double

Fig. 10.11 SUG installation in a shop in Milan. (Source: Kan and Poteliakhoff 1978)

end-sealed 2000 rejected catering cans, giving the required decorative quality to the raw material. The majority of mounting details were either entirely designed or at least finalized on site. Specially developed universal plastic clips connected the display units that required re-arrangement and regular dismounting. Certain stands were built with all spot-welded joints in order to withstand the heavy use of a busy shop. The article explains that the contract was completed in seven days, with a degree of cooperation by client and suppliers unknown in England, a detail probably not highlighted by chance. In fact, cooperation between parties could be very useful to initiate a new design method such as the reuse of reclaimed materials structured on a national scale. The essay concludes with another curious detail, describing that on the introduction day, some demonstrators attacked the shop with paint, and on the following days even with firebombs, luckily missing the group's work (Kan and Poteliakhoff 1978).

This interior design project was the first of SUG's built and commissioned by a client. In this example, waste represents a CPR sustained and used by a community, although mainly for commercial reasons. Still, the degree of collaboration between the different parties is remarkable and can be considered related to a commoning process. The Italian manufacturer collaborated in the project, generously sealing the cans, probably without being paid. Plastic clips were specially developed, many mounting details and re-arrangements were realized on site with a high degree of cooperation not only by the suppliers but also by the client. The cooperation between practices was fundamental for the success of the project, which experimented with new methods of supply and construction.

It is ironic and remarkable that on one hand local actors strongly cooperated to unlock waste materials as a CPR through a commoning process; on the other hand, some other local actors, violent demonstrators during the Italian historical period named the years of lead, attacked and tried to destroy what they probably considered a regular shop built with standard industrial materials.

8 The Tin-Can Beam as a Waste Backbone

The Tin-Can Beam project by Michael Poteliakhoff from SUG is published in the same issue of *Architectural Design* (Kan and Poteliakhoff 1978). The beam is a spin-off from the project initiated by Kan at PCL in 1975 (Pawley 1975c). The beam is a compromise, because it combines reclaimed tin cans with new timber. The article describes the beam's technical details, comparing it with a new one. In the prototype, the new timber is a section of 50 mm x 25 mm, while the ten reclaimed tin cans are 175 mm tall and have a 150 mm diameter each. The construction process is divided into three phases: the base and any remains of the ends of the tin can are removed; the metal is snipped, flattened and folded to an oval profile to fit the timber; tin cans are placed between timber and pattern and nailed down with 25 mm flat-head nails. The Tin-Can Beam prototype, of which the alignment could be adjusted to give a pre-determined curvature, was tested with the support of the PCL engineering department for deflection over a clear span of 3.58 m. The beam was compared with a standard new solid joist, with negative results on several criteria. The beam deflection was excessive for many uses, it could not be used in standard fire-resistant timber floor constructions due to its steel content, and it required two hours of extra labor compared to the standard one. However, the cost of the Tin-Can Beam, almost two British pounds, was an advantage compared to more than four British pounds for a standard beam. Furthermore, it was composed of a smaller quantity of timber, so it was environmentally friendly and convenient for do-it-yourself construction. The article concludes with a very interesting detail. It explains that the design has not been patented due to the group's clearly stated goal that secondary use discipline and knowledge must be spread freely to increase the opportunities for re-using raw materials (Kan and Poteliakhoff 1978).

SUG's care work as defined by Bollier is visible even in this structural element. The beam first developed at PCL and further tested and transformed by Poteliakhoff is one of the backbones of several SUG projects. The last lines of this article state the importance to the group of diffusing the knowledge of their care work, craft skills and social practices. The decisions not to patent the design and to broadcast their work on television are ways to promote the development of waste as a CPR. The group tries to scale-up the commoning process as a social practice of potential mutual collaboration, support, communication and experimentation between more potential involved actors in the future. This project shows some limits of reusing materials on a big scale. In general, at the time, new materials were more efficient and affordable. On the other hand, the beam is still functioning very efficiently.

Moreover, the fact that it is possible to recognize the SUG style even from a structural component due to the tin cans is remarkable in terms of design and aesthetics. The user would recognize something familiar in the beam, and discover that it is composed of everyday use objects only after observing it in detail. In this case, too, it is possible to refer to a commons aesthetics.

9 Conclusions

Architects often represent the mainstream trend of economic profit as a primary goal for project developments in the built environment. However, architects like SUG operate differently, moving away from a strict client-architect relationship to more collaborative practices and commoning processes in which they take several roles not only as designers but also as researchers, technologists, DIY-builders, facilitators, developers, and initiators (Havik and Pllumbi 2020).

In the 1970s SUG adopted the same design method with reused tin cans for a house, a greenhouse and an interior design project. The generative and repetitive feature of the reused components created a specific design style belonging to the group, recognizable whether the cans were used for a house, a greenhouse, a structural beam or a piece of furniture. This feature can relate to the concept of commons aesthetics discussed by Greenfield and Bingham-Hall. SUG, with their research and development about recycled materials for construction, attempted to propose a new architectural approach. The building elements designed with reclaimed materials must perform to building specifications such as being weather proof and structurally tested. The author of the 1978 *AD* article defines SUG's architectural approach as maintaining a social and historic perspective to the design, as well as being environmentally friendly. *AD* emphasized the historic perspective, probably because SUG reclaimed local materials collected from no more than a couple of dozen kilometers from the building site. *AD* pointed at the social perspective because during a time of economic and social crisis, SUG's approach opened up new practices of cooperation and job opportunities related to commerce, collection, manufacture and assemblage of reclaimed materials. The architects of SUG, instead of purchasing the materials, collected the used materials from different sites and stored them in different locations before the application to new buildings. They were in charge of the entire reuse process, with innovative collection methods, construction of building components with reused materials. In SUG and Pawley's projects, like the construction processes of cans walls and beams, urban waste materials were reused as material commons, through craft skills and norms of art representing immaterial commons. Commoning processes as social practices of mutual collaboration, support, negotiation, communication and experimentation among architects, researchers, authorities, users, manufacturers, clients were needed as a system to manage the CPR.

The work of SUG and Pawley seems to be characterized by the concept of care work described by David Bollier or affective labor as developed by Neera Singh.

Singh reminds us that while in market systems labor is motivated by monetary reward, it seems that processes of commoning are instead characterized by affective labor (Singh 2013). David Bollier adds that rather than looking to the state as the main guarantor of their interests, commoners prefer to directly control resources and cities that matter to their life. From this perspective, Pawley and SUG can be considered commoners who see waste materials not only as an unused resource, but also as a symptom of an unhealthy consumption society. They claim that a change of culture is needed, which would accept the concept of secondary use and garbage housing. In the last lines of his book, Pawley notes that the act of building with any type of garbage "encapsulates too much truth about the nature and weakness of our society to be ignored" (Pawley 1975a, 114). With this essay I hope to open up future discussions about the commons concerning architectural thinking and practices for logics and processes that go beyond the state and the market, too often considered the main driver of the development of the city.

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