CHAPTER 3

Compound 13 Lab, Mumbai: Learning Through Waste Ecologies

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Material Waste Flows in Mumbai

Mumbai is a major financial, commercial, and entertainment hub. It is also one of the most unequal cities in the world, where extreme poverty co-exists with extreme wealth. In a mega-city of 21 million people operating without centralised infrastructures to match the scale of the population, waste flows through a complex network of brokerage and trade in which the municipal authorities play only a partial role. Due to limited municipal waste collection and household segregation, domestic and commercial waste, made up of wet waste (food, organic and biodegradable stuff) and

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some hard waste like plastics and packaging material, finds its way to landfill where it is scoured through by waste pickers to extract recyclable materials. However, most of the city's hard waste escapes landfill, through processes where it re-acquires value, traded via a complex web of social and material relations. Discarded objects are traded in an intricate supply chain of collectors, brokers, and dealers, before they are broken down, repurposed, or recycled (Doron & Jeffrey, 2018). Dharavi, home to 1.4 million people on 2.1 square km of prime land in the centre of Mumbai, is one of the largest informal settlements in the world. Hundreds of workers sort and trade plastics and other recyclable materials in an area of Dharavi known as 13 Compounds.

As public awareness of the importance of recycling has grown, the term has been adopted by frontline workers as a claim to the broader societal value of their work. Vinod Shetty, founding director of ACORN India and a labour lawyer in the Bombay High Court, places emphasis on human rights and labour rights, attempting to shift prevailing attitudes about those handling waste as dirty, undeserving, and disposable, and instead acknowledging them as 'green collar workers' (Jeffery & Parry, 2023), repositioning their work as valuable and environmentally significant.

These 'human infrastructures' (Jeffery & Parry, 2023) of the informal waste recovery industry considerably reduce the volume of plastic that goes to incineration or landfill. The alternative trade networks of informal recycling create supply chains that contribute to the wider economy as well as sustaining hundreds of thousands of family livelihoods. Dharavi is now a key target for speculative redevelopment: the current version of the Dharavi Redevelopment Plan envisages demolishing most of the existing structures, replacing the piecemeal development with a high-rise business district which will be entirely unaffordable for those currently living and working there.

India has achieved one of the highest recycling rates in the world, developed through grass roots entrepreneurialism. The informal waste trade has allowed many of Mumbai's poorest inhabitants to find work; some have developed their own businesses over generations. Unlike today's institutional approach to sustainability, the origins of the informal plastic recycling industry did not come from the lofty aspiration to generate a 'circular economy'; rather, it arose from basic needs, livelihood, and frugality. The 'waste commons' of available raw material, discarded and scattered across public spaces, can be mined for value (O'Hare, 2022).

People undertaking this work generally have very limited choices, often with family and caste/class ties to this occupation, and costs of entry are

low (Gill, 2010; Gidwani, 2015). At its peak, we estimate that Dharavi's 13 Compounds recycled 80% of Mumbai's hard waste, supporting the livelihoods of around 250,000 informal waste workers, ranging from waste pickers scouring the streets, to *kabadiwalas* (neighbourhood waste collectors), *feriwalas* (transporters) sorters, brokers, dealers, and remanufacturing. The 13 Compounds is just a small part of Dharavi's extraordinary economic success: as one of the world's most famous informal settlements, it has resisted numerous attempts at wholesale redevelopment over recent decades (Fig. 3.1).

Despite its remarkable achievement in building a highly efficient self-organised circular economy, Dharavi is far from an ecological paradise. It does however contain many other examples of urban innovation in design and infrastructure at neighbourhood level. We have referred to it elsewhere as a 'smart city from below' (Jeffery & Parry, 2023). Places like Dharavi tend to be rendered as junk or waste land, ripe for speculative 'improvement' by the state and by the powerful, because of the negative associations of being labelled as a 'slum': a legal term with origins in colonial governance (Chhabria, 2019). By extension, people who live in such

Fig. 3.1 Rooftops of the 13 Compounds, Dharavi, Mumbai, 2012. (Image: Ben Parry)

settlements are treated as disposable, as if nothing can be learned from them and they do not matter. These forms of exclusion are partially rooted in India's caste/class system. Families with intergenerational knowledge of waste work are simply undertaking their 'assigned roles', cleaning up the rubbish and waste generated by the upper castes (Doron & Jeffrey, 2018). Waste work therefore becomes synonymous with the differential valuing of human life and with untouchability and disposability.

Creative Learning and the Waste Economy

As a hybrid of urban lab, art space, community centre, maker space, and classroom, the Compound 13 Lab project weaves together pedagogical experimentation, arts practice, ecological concerns, and social solidarity in conversation with the everyday realities and life challenges of people living in Dharavi. Its name, *Compound Tera* (13 Compounds) in Hindi, makes a connection between the 13 separately owned compounds that originally formed Dharavi's recycling district, as well as the idea of combining or compounding different materials, perspectives, and experiences.

The project, which began in 2012, is built on a collaboration with ACORN (Association of Community Organisations for Reform Now) India, who have a long history of advocacy and support for waste workers. At that time ACORN occupied a former recycling workshop (*gowdown*) in the heart of the waste processing and recycling activity, with membership of over 500 families living and working within Dharavi and the nearby Bandra slum. In 2011, a series of state-led expulsions forced many ACORN members to relocate following the demolition of 450 homes and small recycling businesses along the steel water pipelines that run above ground on their journey to carry the city's fresh water supply (Parry, 2015). Many are familiar with this iconic pipeline location through various forms of film and media including scenes from Danny Boyle's *Slumdog Millionaire* (2008) to articles in National Geographic (2007), and Kevin McCloud's Channel 4 documentary, *Slumming It* (2010).

The initial remit of ACORN had been to improve the welfare and working conditions of waste worker communities across the city. Over the years supporting these workers, ACORN increasingly turned their focus to the children and young people of families making their living from the city's waste, attempting to change their life trajectories and free them from the hardships and toxic burdens of waste work. Central to this approach is the imaginative use of arts-based methods to encourage broad

participation, alongside more traditional classes in maths and literacy. Compound 13 Lab augments this work by inviting artists from a variety of backgrounds, including visual art, theatre, music, and craft, to work with ACORN's young people, providing a platform which supports an ambitious programme of creative engagement. The principal vehicle for this is an extended artist residency programme, which also sets out to support early career social practice artists.

The activities generated by the residency programme help establish an innovative and alternative approach to the 'maker space' and 'classroom', providing free learning resources for young people aged 8–25 who would otherwise have few opportunities of this type. Through a process of increasingly self-organised making and learning, Compound 13 Lab offers ACORN's young people access to current technologies in digital media, music, design, 3D printing, and digital fabrication.

One key concern was how artists might work more ethically and effectively in such contested spaces. Dharavi remains a site of extreme poverty and hardship. The well-trodden issues of artists working in deprived communities (Kelly & Jeffery, 2016) are further problematised by the international fame of Dharavi as an urban phenomenon of bottom-up ingenuity, as well as a highly visible site of socio-material possibility that continues to attract artists. Projects which succumbed to the lure of art world recognition by inviting Mumbai's cultural elite into Dharavi's neighbourhoods to 'look at art' felt very out of context, falling into a similar category of outsider presence as the popular slum tours that take tourists on a journey through Dharavi's contrasting neighbourhoods. The Lab therefore set out to promote more meaningful and reciprocal interaction between visiting artists and community members, beyond the short term 'encounters' that are more common in community arts projects. Inviting young artists that had trained on Shiv Nadar University's MFA programme provided challenging but invaluable professional practice experience.

Within academic and urban research, Dharavi has long been an international 'go-to' site for all manner of excursions, projects, and case studies: a contender for the most documented informal settlement on the planet and a hotspot for media representation (Jeffery & Parry, 2023). We observed that the work being produced by NGOs, planners, and academics was being published internationally but was almost never returned to community members. An early proposal was the creation of Dharavi Digital Public Library, where residents could access materials and texts being produced about their everyday lives and the possible future of their

communities (Parry, 2015). Another important influence was the idea of establishing a 'maker space', building on the intense making and repair culture within the neighbourhood. Within the community, there are deep knowledges of manufacturing and repair, but few spaces or opportunities for people to experiment, or take time to think, create together or innovate. From the outset, we asked: what kind of spaces could be created where knowledges could be exchanged within and beyond the community?

Learning Through Neighbourhood Practices

We set out to connect the Lab's work into wider international conversations about the future of learning and issues of urban sustainability. Alongside the creative programme, the Lab team conducted in-depth research and data collection, quantifying and gathering data on the quantities of plastic that the informal sector takes out of the system. Dharavi's 13 Compounds, as one of about 20 such sorting and trading hubs across the Mumbai Metropolitan Region, alone handles around between 500 and 800 tonnes of plastic waste per day, around 187,000 tonnes annually (Pancholi & Kamble, 2023). Effectively, India's informal waste sector provides a waste management service operated by the urban poor without any funding or acknowledgement by the state, substantially subsidising the city as a whole, which balances its enormous waste problem on the back of the poorly remunerated labour of the urban underclasses. As a 'thinking and making' space linked to international research networks, C13 Lab set out to connect the hidden knowledges embedded in waste work, effectively local cultures of innovation, with broader international debates about sustainable futures. It attempted to reframe public debate: representing waste work and the marginalised people undertaking it as performing valuable infrastructural maintenance work.

'Sustainable urbanism' models are widely celebrated (Joshi et al., 2011) but Dharavi is rarely represented as a set of intergenerational practices and knowledges that could offer frameworks for 'urban learning': considering how urban sustainability is created through the lived practices of the neighbourhood. Perspectives of urban development and patterns of urban inhabitation informed work undertaken in the Lab, particularly the materials, resources, and knowledges involved in the everyday life experiences of its users. The Lab's data gathering work included a mapping and photography project in which young participants developed a typology of waste work actors and processing centres by taking geo-tagged

photographs using smartphones. These were later uploaded to an interactive map showing key locations and waste flows, directly contributing to our research mapping the movement of waste materials through Dharavi's trade networks.

Artist Residency as Method

Creative and cultural learning enables people to express ideas, feelings, and aspirations about their neighbourhoods, including through creative action (Jeffery, 2005; Leeson, 2017). Some distinctive skills that artists and creative producers bring that add value and complement the expertise of other researchers, facilitators, and educators include encouraging encounter and interaction between diverse people; animating shared and public spaces; infusing meaning, exploring how a place feels and is experienced; expressing the intangible and the invisible; and stimulating new ideas and approaches through creating situations in which people encounter new or different ideas.

Ongoing activities at the lab include art and design classes, workshops, training sessions for members aged 8–25, talks, film screenings, and an ongoing programme of guest residencies, internationally and within India. Young people work alongside artists on a variety of different projects, which advance through a process of co-creation, shared-learning, and co-authorship. These activities are broadly structured around a set of themes which weave together practices of participatory action research, knowledge production and learning, creative ideation, and experimental making (Jeffery & Parry, 2023; Wakeford & Sanchez Rodriquez, 2018).

One of the first and positive interventions of the Lab was to use the artist-residency platform to address gender divisions that meant that some of ACORN's activities tended towards all-male groups. Given the prevailing climate of increasing communal tension within India (Banaji, 2024) the achievements of ACORN in promoting equality and integration should not be underestimated. The Lab consciously explored how approaches to participatory art projects and their processes of engagement can challenge them, creating a safer space for young men and women to mix, including Hindu and Muslim youth from different backgrounds.

One such intervention involved artist Aqui Thami, who with her partner Himanshu runs a parallel initiative, Dharavi Art Room, a longstanding creative space for young people to make art and learn. Thami provides a full account of her project, 'Precious' in *Waste Work: the art of survival in*

Dharavi (Jeffery & Parry, 2023). She initiated intergenerational conversations between young women and their mothers and grandmothers about jewellery which for various reasons had been lost or sold, usually to do with financial hardship. These narrated stories were recorded, and pencil drawings of the lost jewellery were turned into 3D digital models, which were printed and placed into jewellery cases. Recordings of the stories of each item were included in the cases. One case was returned to the family and the other was exhibited, as a means of sharing public dialogues about precious items and the ways in which different notions of value had been embedded in these 'lost' objects (Jeffery & Parry, 2023).

Issues of access, safety, and violence against women in the context of very male-dominated workspaces were rarely discussed publicly. Traditional gender roles within family life and the expected share of domestic labour meant young women were discouraged from attending spaces like ACORN or the Lab. Bringing more gender awareness and equality into the work of the lab required foregrounding women's voices and experiences. Given how internalised patriarchal structures are, this required a slow, subtle process of trying to unpick male dominance in the lab space—involving learning and unlearning, trying things out, and experimenting, with facilitators observing, listening, and encouraging voice. These informal values of the lab are important because they too provide 'human infrastructure': facilitators model mentorship, and practices of care, respect, and dignity, which are not always explicitly articulated but are implicit in expectations about how people relate to each other. Lab participants undertake journeys across the city to visit unfamiliar spaces such as museums and concert halls, making such spaces less intimidating and building knowledge and confidence.

Combining traditional drawing with digital design capabilities, Thami's 'Precious' project exemplified how artists can make use of 3D modelling and printing technology. The practical processes and material relations of 3D printing and plastic recycling have a specific connection to the political ecologies of waste and Dharavi's urban landscape. Considering alternative futures for plastic, drawing upon open-source resources, was intended to expand the horizon of Dharavi's self-built urbanism; empowering young people to get involved in design and manufacturing processes. The affordances of rapid prototyping technologies were easily comprehensible for participants who had grown up around the plastics industries, familiar with commercial plastic manufacturing. Within Dharavi's urban fabric, integrated manufacturing technologies are highly visible, at street and

neighbourhood level, rather than kept hidden in closed-off industrial areas. One of our objectives had been to find out if we could use Dharavi's plastic waste to manufacture recycled filament, but as technologies improved with faster print heads and finer nozzles the demand for higher quality and more stable filament increased. Even so, the use of 3D printers proved challenging, with the requirement to master 3D design software, as well the need for appropriate technical support. The environment itself, high temperature fluctuation, humidity, power outages, and use of fans, all worked against the regulated and stabilised conditions necessary for reliable printing with plastic filament.

British artist Ian Dawson undertook several residencies that used plastic and 3D printing as a tool of cultural and creative exchange (Fig. 3.2), working with young people to demonstrate the possibilities of the technologies, from 3D scanning of objects and environments, to assembling digital artefacts as well as printing objects to take away (Jeffery & Parry, 2023). Amongst his many collaborations with the Lab, Dawson brought in a project with London's Horniman Museum: objects from the

Fig. 3.2 Plastic sculpture workshop led by Ian Dawson at Compound 13 Lab, Dharavi. (Image: Ben Parry)

Horniman's extensive collection of Indian artefacts were shared with community members. Each selected one item which corresponded to familial objects with value in their own community. These artefacts were then scanned and reprinted and the plastic replicas were then returned to participants.

Finding different ways to record, photograph, and document what was happening within the neighbourhood raised questions of citizen journalism. Amol Lalzare, a former rickshaw driver, developed his own journalistic practice and facilitated participants' storytelling skills through a series of media workshops: in these forms of learning exchange, projects are designed with learning and development for everyone in mind (Jeffery, 2005). Lalzare's films are a potent example of how participatory approaches to storytelling using readily available media tools can enable the voices of the urban poor to be amplified. A participant led, issue-driven approach can efficiently develop citizen research skills, journalism, and filmmaking using the full potential of the mobile phone and free-to-use video editing software.

Only a minority of people in Dharavi have formal education beyond basic numeracy and literacy, and few can afford to attend further or higher education, so learning and skills acquisition is undertaken via other means, including kinship networks, and increasingly through digital and online engagement via the rapidly growing use of smartphones.

Global Conversations on Climate Action

The Lab created opportunities to incorporate community voices into creative learning and exchange through a variety of different methods, with the everyday struggles and stories of participants shaping the themes and content of its activities. On occasion our work was internationally recognised, and we were invited to contribute to projects elsewhere.

For example, Compound 13 Lab was invited to partner with the Museum for the United Nations 'Global We' project in what is the largest recorded global climate dialogue to date, involving 10,000 participants. Connecting people in 22 locations across the world via a network of portals (recycled shipping containers with real-time immersive video-streaming technology) 'Global We' facilitated over 3000 conversations about climate change between remote sites, without the need to travel (UN Live, Museum for the United Nations, n.d.). Between September 2022 to April 2023, the Mumbai portal, placed in the grounds of a local Dharavi school,

participated in over 120 international conversations. Inviting diverse people from across the city, our participants engaged in dialogues, workshops, rap battles, and music sessions with people in locations including Jakarta, Kigali, Johannesburg, Mexico City, and Dhaka.

During the same period ACORN and the Lab had begun to engage a women's waste picker collective that had, unusually, organised themselves to protect against the dangers of waste collecting, including harassment and territorial poaching. Instead of being subjected to daily-wage fluctuations dependent entirely on the volume and kinds of waste gathered on the streets of Dharavi during a single shift, they pooled their catch and distributed earnings equally among the group. Having incorporated their stories into film, the UN Live portal enabled us to amplify their normally unheard voices and lived experiences to a wide international audience, including policymakers and stakeholders of the United Nations Climate Change Conferences in Egypt and the UAE.

Alongside schoolteachers, pupils, environmentalists, activists, artists, scientists, and citizen scientists, the contributions of waste workers and the network of Dharavi hip-hop artists connected the ambitions of the Lab with global conversations about sustainability and climate change. Bringing the women's waste picker collective into the portal, foregrounding their voices and perspectives as frontline workers in the informal waste industry, and enabling conversations with, for example, indigenous youth activists in Alaska, offer rare and significant exchanges that move beyond the confines of the portal into the orbit of decision makers.

Building Links with Artisanal Cultures of Making

Building up a programme of classes and workshops, responding to everyday conversations also deepened our understanding of the demographics of Compound 13 Lab's youth and the families they belong to. Many of them are from families of craft workers belonging to various *Vishwakarma* castes. Their identity is strongly tied to their profession. From various parts of the country, their traditional expertise lies in being carpenters, stonemasons, blacksmiths, bronze/copper smiths, or goldsmiths. Migration to Dharavi was often linked to the lack of local opportunities for practising their family's previous occupation. Knowledge and skills are thus less likely to be passed on intergenerationally, as would have happened in their hometowns.

Dharavi's young people identified themselves as insiders and the visiting artists/designers/filmmakers as outsiders: they were highly conscious of the differences of formal education, class or caste, and language. We felt that it was essential to bring artists/craftspeople from different backgrounds to interact at the Lab, to make interactions more fluid and provide role models for young people which did not simply reproduce elite kinds of education. Crafts which used recycling and locally available material were chosen. We hoped to challenge hierarchies, such as the downgrading of traditional crafts within formally taught art and design since colonial times, which have inflected discourses surrounding contemporary art, and social, political, and popular culture.

A significant example that used traditional craft to tell the story of recycling in Dharavi took place during a residency by Mamoni Chitrakar, an eighth-generation *patua* (painter) from Medinapore in West Bengal. Mamoni was trained as child by her mother, Swarna Chitrakar, in the art of *Patachitra* and both their work has been in exhibitions across India and abroad. *Patachitra* is a traditional form of storytelling from Bengal: as village bards they travel around neighbouring villages singing and painting on various themes ranging from mythological stories to historical as well as contemporary accounts, mixing them up with socio-political issues. The stories are first written then composed into song (*patar gaan*) and the rhythm of the words provides the structure to the painting. The painting is made on scrolls of paper unfolding either vertically or horizontally, with bold colours, lines, and strokes using natural colours that are made by hand using local plants. As the nine-metre long scroll unfolds, Mamoni sings the *patar gaan*. Having painted other river stories earlier, the Mithi river scroll became unique as it recounted the history of the waste pickers and recyclers in Dharavi (Fig. 3.3).

During the workshops Mamoni walked around the nature park pointing out the trees and plants from which she makes her colours. Demonstrating how a specific colour can be made from herbs and condiments available in everyone's kitchens or readily available local plants was inspirational for participants, who would later see themselves in the stories being told. Used coconut shells were best for mixing, and how to store colours was another important discovery. Paints are quite expensive and young people generally are not given colours due to paucity of means at home: acrylic colours provided at the Lab generally dry up very quickly and become unusable. By contrast, these colours could be reused by just adding water and are very economical to make.

Fig. 3.3 Mamoni Chitrakar, The Mithi River Scroll, 2023. Maharashtra Nature Park, Dharavi, Mumbai. (Image: Ben Parry)

The story of Mamoni's own life as an artist and the production of the scroll, and how it enabled a big debate about the histories of Dharavi, the Mithi river, and the past, present, and future of that space exemplifies how the residency programme at the lab moved beyond a conventional art curriculum. It wrapped its audiences in the traditional craft of oral storytelling as a profound piece of work rooted in performance and exchange—whose approach to art making and fostering understanding meant that those who saw it were immediately able to relate to it. The fact that Mamoni was well travelled (the young people with smartphones had quickly researched her accomplishments) but spoke and sang mostly in Bengali made her 'one of them', and she became an instant role model.

In April 2023, as part of showcasing the work of the Lab, the scroll was exhibited at the Maharashtra Nature Park, alongside a video of Mamoni performing the scroll, enabling public dialogue with visitors and the many school groups in attendance. A green oasis providing education and awareness about nature conservation, the Maharashtra Nature Park runs along the banks of the Mithi River on the northern edge of Dharavi. Reclaimed from a former waste dumping ground, the park speaks of the histories of

waste and the potential for ecological restoration. The scroll provided narratives in which the river and the nature park were part of learning. The exhibition raised many questions about the role of the park: what is nature, what is not, what does it mean to live next to a polluted river? How do the ecologies of the city and local ways of life connect to issues of biodiversity? All our projects set out to connect with nearby resources, bringing artefacts, objects, stories, and people into a space to generate new learning. We describe this as *building shared knowledge platforms* using arts-based processes in which everyone can observe and participate. Mamoni's approach—singing to the scroll—also creates a certain sense of ritual, distance, and objectivity, which the young people can relate to, but which is also 'other'. These insider/outsider relationships are important because they give permission to think differently, more boldly, and perhaps more openly and interculturally.

Lab as 'Urban Assemblage'

People who live in Dharavi have a strong sense of identity: there is always an awareness of 'we' and 'us'—of inside/outside relationships, and it is always clear who is from outside. This strong sense that 'Dharavi is ours' is built on decades of intergenerational struggle to carve out viable spaces to build livelihoods on five acres of occupied, reclaimed land. The sheer density and intensity of social, spatial and economic relations generates many different forms of solidarity and self-help.

Alongside ACORN, the Lab opens alternative possibilities and pathways to break the cycle of being drawn into exploitative labour and present alternative options for earning and learning. Simply left to individual families, economic imperatives usually mean that by the age of 13 or 14 young people either must join a family business or get married. ACORN and the Lab's work creates opportunities to learn new skills and widen choices. Within Dharavi there are opportunities to connect and learn: through schools, projects, NGOs, and industries, because of the geographical advantage of its location and connectivity. This homegrown ecology of learning and human resources is likely to be lost if the Dharavi Redevelopment Plan goes ahead in its current form.

These forms of connective pedagogy occupy a pivotal role in the realm of contemporary public art, community-based art, and situated practices. The Lab has served as the foundation for collaboration and co-production of knowledge and the creation of a safe space that facilitates the mediation

of societal differences. Pedagogy in this context involves a dynamic process where both teacher and learner engage in simultaneous learning and unlearning. They collaborate in the pursuit of knowledge production, forming communities through ongoing interactions, and the shared utilisation of space, expertise, and labour, all aimed at fostering much-needed socio-political, sustainable environmental change. Within this framework, the artist assumes various roles, serving as an organiser, creator, catalyst, or empathetic collaborator. This environment provides secure spaces for mediating caste, class, and gender differences through processes of empathy, care, and repair.

In these ways, within the work of Compound 13 Lab, notions of life, livelihood, learning, work and art all come together. It is also a place, under the umbrella of ACORN's work in general, that young people want to come to and 'hang out' in, much in the tradition of youth centres. Young people who attend Compound 13 Lab report that this atmosphere of acceptance and inclusion contrasts with their experiences of formal schooling. Most of what is taught in schools seems very distant from the kinds of lives that they are living, whereas the Lab directly addresses their circumstances. Our notion of a living curriculum, built upon the principle of designing learning frameworks which are not fixed, but open, adaptable and dialogical, was an essential part of imagining how the Lab might function: where informal urban knowledges, rooted in the everyday experiences of people living in neighbourhoods like Dharavi, intersect with other opportunities for shared learning and research. We consider the Lab as a physical place of possibility, a space for thinking and making, underpinned by a set of relationships that offer possibilities for imagining, living differently and doing things differently. Deployed here art creates a space of dialogue, shared learning and knowledge making, enabling us to work together through different ways of knowing, across languages and cultures, and to develop a sense of creative agency.

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