Wool Mountain Pakistan Research Lab:

bringing research to the mountain

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The fashion industry is one of the largest, most resource intensive industries. It is a powerful engine for global growth and development, but the current model is pushing the earth beyond its planetary boundaries and challenging social justice. The industry accounts for 4% of greenhouse gas emissions, 20% of industrial water pollution globally and workers face issues such as hazardous environment and low wages.

– Global Fashion Agenda

92 million tonnes of fabric is wasted every year, equalling 1 truck to landfill every second. By 2030, we are expected as a whole to be discarding more than 134 million tonnes of textiles a year.

– Global Fashion Agenda

An estimated $500 billion value is lost every year due to clothing that's barely worn and rarely recycle.

– Ellen McCarthur Foundation,

New Textiles Economy: Redesigning Fashion's Future Report, 2017

Every 5th piece produced in the garment industry ends up as garbage without being worn.

– Global Fashion Agenda, Fashion on Climate video.

In 2018, the fashion industry produced 2,1 billion tonnes of CO2. That's 4% of global carbon emissions.

– USEPA

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The first wool research lab

With partners Hasnain Lilani, Co-Founder of Recycle Wool based in Karachi, Pakistan, Designer and Wool Researcher Cynthia Hathaway, Founder of WASA (Wool Alliance for Social Agency), and social entrepreneur Gwendolyn Floyd, the foundations are set for the first wool research lab at the base of one of the largest post consumer wool garment waste sites, Wool Mountain Pakistan Research Lab or WMP-RL. We investigate wool waste streams which start from the back of a sheep to mountains of post consumer wool garment waste, and research applications for both raw and processed wool for agriculture, and building applications. Whilst doing so, we prioritize economic, cultural and social resilience through wool in Pakistan, and along the global wool procurement chain.

At WMP-RL **we place wool at the top of the pyramid**, restoring wool as a natural 'golden fleece' with high economic, cultural and social value. We choose to create a variety of sustainable uses primarily outside of fashion. We also think small herding and transhumance practices, sustainable industrial production and recycling processes, and the use and reuse of wool does little harm in comparison to the energy, pollution and extractive processes used in cotton (including organic) and polyester production.

Since 2020, WMP-RL focuses on recycling untouched post consumer garments: wool coats and jackets, and value added applications of broader micron raw wool. WMP focuses on the sustainable recycling and applications of these materials for other than garment-to-garment, such as for agricultural and building sectors.

WMP-RL is raising money for a wool-recycling infrastructure, consisting of a processing facility, recycling technology, and research lab. For this funding, we are developing a multidisciplinary and international collective of research partners in design, bio-engineering, social and cultural entrepreneurship.

Who we are

Wool Mountain Pakistan Research Lab (WMP-RL) is a multi-disciplinary, and international research project dedicated to wool recycling. The project stems from the collaboration between WASA (Wool Alliance for Social Agency), Recycle Wool and Gwendolyn Floyd.

WASA is the research collective led by award winning designer, wool researcher and transhumance promoter Cynthia Hathaway. WASA brings together various stakeholders within the wool production chain with the aim to protect the social, cultural, material and environmental ecologies of wool. WASA also hosts The School of Shepherding from which philosophical guidelines for designing with custodian skills support human and non-human ecologies throughout the wool chain.

Wool Mountain Pakistan Research Lab bringing research to life in Karachi

Recycle Wool, co-founded by sustainable textile researcher Hasnain Lilani, is the largest recycling company of post consumer sweater waste based in Karachi, Pakistan. Hasnain has extensive experience working in the textile industry for over 15 years, with 11 of these in denim research and handcraft textiles in Pakistan and Europe. Since 2016, Recycle Wool is the biggest importer and recycler of post-consumer sweater and other wool garment waste from around the world. **In 2021, Recycle Wool imported 5000 tons of used sweaters and has an inventory of 40,000 kilos of coats, jackets and pants.** Hasnain's network of textile research in recycling is extensive. In place is a used textile supply chain spanning Canada, USA, France, Italy, Sweden, Japan and China.

Gwendolyn Floyd is a designer and venture-backed entrepreneur. She is founder of 4 companies, and has 15 years of experience leading teams and projects working at the intersection of design, technology, and international development. Her work in human centered design and fashion supply chain innovation has been celebrated and awarded for its novel approach and measurably high social and economic impact.

Focus Pakistan

The impact of the garment industry on countries like Pakistan has been drastic, with great damage to the environment and wellbeing of its population. Production of garments uses great amounts of water, forcing inhabitants to import water in bottles. As large fashion brands are finally forced into transparency, there are still many garment workers making small wages and working under difficult factory conditions. At the other end of the spectrum, Pakistan is dealing with post consumer garment waste, and as Hasnain Lilani states, 'the global mess is diverted back to my country'. Companies like Recycle Wool are at the forefront buying wool garment waste and giving it a second life through recycling into yarns. As a socially responsible company, Recycle Wool is a family-run business, and places worker's safety, well being and wage security as a priority.

Although Pakistan is one of the largest importers of global garment wool waste, it needs investment in innovative chemical and biological recycling techniques. **At present, international research is focused on cotton and polyesters. At WMP-RL, the challenge is to research, for example, enzyme processes that redeem wool fibres from blends.** At present time, processes burn out or disintegrate wool to extract polyester or cotton fibres.

With enormous inventories of wool garment waste in Pakistan, the opportunity arises to locally manufacture life-supporting and ecologically minded products. **We are the first research Lab to focus on bio-processing of wool, creating enormous economic potential for the region, and the wool sector.** When more wool is used in manufacturing, this 'golden fleece' is redeemed for its environmental, and sustainable qualities out performing those of cottons and polyesters.

At WMP-RL, we believe in bringing research 'to the mountain', and for the valuation of 'end of market' wool for local resilience. **At WMP-RL, high and low technologies are harmonized.** Supporting a skilled labor force trained in sorting, separation, and grading post consumer garment waste, new research and development lines will not necessarily make extinct, but advance present skills, and give new employment opportunities and secure more local jobs for these outstanding skill sets.

As an important post consumer wool waste recycling hub, the international brokering and transport infrastructure already exists to and from Pakistan, delivering a constant supply of wool and garment waste, and a demand chain for recycled wool products.

Pakistan is at the beginning, middle and end of a multi-layered system of wool, and thus, a choice location for researching a future wool ecosystem. Pakistan is an ancient 'wool basket' nation, with the production of fine carpets and blankets. The first looms were developed along the fertile river valleys of the Indus around c. 8500 B.C[1]. The Lohi is Pakistan's ancient indigenous sheep breed and supplies meat and wool to the region through small herd shepherding practices.

Most recycling research of textiles is focused on technological fixes. **At WMP-RL, emphasis is on both technical and socially sustainable research, taking into account a fuller spectrum of wool concerns and stakeholders.** This includes policy makers whose policies mainly favor meat rearing animals, shepherds who receive little or negative cents for their wool and skills, sheep breeders promoting breed diversification, producers of wool products, consumers seeking sustainable choices, and textile laborers of whom many are made invisible and disenfranchised.

1, Eric Broudy, The Book of Looms. A History of the Handloom from Ancient Times to the Present (Lebanon: University Press of New England, 1979), 22.

Urgency

The systematic devaluation cycle of wool throughout its life cycle creates an urgent call for International research. An incredible sustainable material and regenerative resource, wool waste in raw, pre or post- production phases is often incinerated, thrown in garbage dumps or even dumped in oceans. As massive global piles grow from post-consumer textile waste, research becomes essential to curb the waste cycle. This demands using more sustainable materials such as wool in production, and supporting the many who deal with global wool waste streams.

Most sustainability research and innovation in the textile recycling industry is focused on cotton and polyester regardless of wool's lower impact on the environment. Biological technology processes such as enzymatic separation are used to recycle and reintroduce polyesters and cottons into the supply chain. At WMP-RL, we apply this lens of material sciences and innovation to wool fibers from post consumer textiles. By using more wool to make a variety of products, we are challenging a textile industry geared to the promotion and production of massive land and water consuming cottons, and extractive polyesters. Although garment incineration is soon to be banned by EU legislation, without innovative recycling solutions, garment waste will continue to be a problem. There are plans for seven recycling textile hubs in the EU by 2030, however at this stage they are not commercially scaled up [2]. Companies who have experience of recycling, such as Recycle Wool, are already recycling textile waste on an enormous scale, and supply clients throughout North America, Europe and Asia. Whilst waiting for 2030, we need to turn our attention to existing companies in developing nations who provide recycling expertise and knowledge, support local livelihoods, and develop profitable high quality products from global textile waste.

From an ethical perspective, we cannot turn our back on companies and nations who have for decades dealt with our global waste. The time is now to apply generative practices by extending partnerships to benefit all parties along the textile production and value chains. Combining knowledge, technologies, and developing holistic thinking with the wool recycling industries most experienced, yet still marginalized experts and communities, is an economic and moral imperative.

Creating value along the wool chain is urgent, and needs international effort from creative and academic research and industry. By bringing research to the mountain to hubs where the waste is most apparent, is an important shift to contextualizing research.

2. Dalena White, Secretary General IWTO, International Wool Textile Organization, speaking at International 'Virtu-Wool' Research Conference, May 27, 2021

Diversification

Presently, recycling of garment waste holds a double edge sword, especially when more textiles are produced to make garments likely be thrown out again. Fashion trends accelerate this system of short-term use, and landfills around the world are at their breaking point. **Thus, diversification is key.** Recycling wool into a variety of applications showcases it as a suitable material to meet a variety of targets for sustainable resource and product development, processing and use.

Wool Mountain Pakistan's goal is to recycle 100% of wool waste. Some will be reintroduced back into the fashion supply chain, alongside innovative, environment and cost saving applications for the built environment and agriculture. **Research and existing product innovation is showing both raw and recycled wool are ideal for insulation, isolation, building bricks, and soil regeneration.** With the focus on diversification, and introduction of innovative technology, this strategy at WMP-RL improves profitability for the recycling business, whilst increasing local economic, social and environmental resilience.

Global local welfare

WMP is the first research lab dedicated to the re-valuation of wool. With the development of a diversity of wool products, and using the most current sustainable recycling technology, we believe local and global wellbeing is achievable through wool.

The creation of value from wool waste supports entrepreneurial, social and cultural futures in the Pakistan region, and throughout the globalized wool procurement system.

At WMP-RL, end of life wool processing, research and development supports:

1. value and revenue generation: industry reintroduction, dialogue and material evolution
2. resilience and regenerative systems creation supporting research, education, and engagement for ecological resilience. This includes strengthening social fabrics, equitable economies, and multi-specie environmental systems throughout the wool chain.

Wool Mountain Pakistan Research Lab: bringing research to the mountain

The necessary approach for building towards sustainable material and social economies is creating value bridges between existing industry and economic systems, and future oriented models of regenerative and distributive economies. **Especially in developing economies, immediate welfare and environmental solutions must be addressed, and with long-term thinking.** At WMP-RL, we are addressing these issues by eventually exiting the garment-to-garment cycle, creating new wool product and development streams for sustainable housing and agriculture.

Coats + jackets and raw wool: an untapped waste focus

Wool Mountain Pakistan Research Lab will support research focused on two waste streams: raw wool and post consumer wool coat – jacket waste.

Coats and jackets made with wool are the most overlooked items of post consumer garment waste. Although difficult to get data, according to Hasnain Lilani, approximately 80% of wool coats and jackets produced are not recycled, with the other 20% being recycled in an open looped system. **In 2021, Recycle Wool's stock of 1 million kilos of used clothes is made up of 24,000 kilos of wool coats and jackets.** Complicated garments to recycle, wool coats and jackets are a massive problem for growing waste piles. There is currently no market or research being applied to recycling these items. This is because they are very complicated for current recycling processes. Wool coats and jackets are often made with a variety of blends of wool, polyester and cotton. Glues are used to attach linings. Padding is used to create shape and stability. Extra items such as zippers, buttons, linings need to be separated from the main textile. Separation is already done by hand for sweaters, but how to work with blends and glues have yet to be researched.

Although they pose a challenge, we believe with the latest strides in bio engineering wool coat and jacket waste has a future beyond incineration or landfills. If kept out of the garment-to-garment steam, we see the enormous potential of wool coat and jacket recycling for product applications in, for example, isolation, insulation, and brick production.

In addition to wool coats and jackets, WMP-RL focuses on raw and broader micron wool waste (other than merino), for open loop cycling and a variety of outcomes. Looking first locally, and keeping it in, regional wool procurement is a solid resource for raw wool. **In 2010, 42,000 tons of wool was produced in Pakistan.**[3] By diverting raw wool away from export or incineration, WMP-RL supports local wool procurement, such as small herd shepherding practices, and the development of added-value applications for local agriculture, such as soil regeneration, and toxic spill mats, with the potential for export.

3. Beverley Henry, Understanding the Environmental Aspects of Wool: A Review of Lifecycle Assessment Studies, (October 2011), 18.

SOS philosophy

At Wool Mountain Pakistan Research Lab, we are driven by an overlying philosophy, developed through WASA's School of Shepherding, or SOS. The art and science of traditional shepherding practices over centuries has developed a custodianship system shared between peoples, animals, and landscapes around the world. **Inspired by this system of care and dependency, WMP-RL is dedicated to innovation principals and design practices supporting prosperous co-habitation of all terrestrial inhabitants.** For a more resilient future, the stage and audience must be widened, and deep, relational systems thinking used as its choreography.

We welcome you

Demands for circularity within the textile industry, social entrepreneurship, and innovative recycling processes prove WMP-RL is already on course for the required changes needed to reach both EU sustainable textile recycling targets and UN Sustainable Development Goals by 2030.

To further support this demand, Wool Mountain Pakistan Research Lab is establishing a variety of partnerships in the development of sustainable models with Pakistan and global industry regarding global textile waste streams. **A multidisciplinary lab, WMP-RL is the first of its kind, dedicated to recycling innovation to produce diverse product lines using raw wool and garment waste resources.** To partner with WMP-RL is a unique opportunity to make real change that effects local and global welfare of people, animals and landscapes affiliated with wool.

To be a part of this exciting and first of its kind wool research and development lab, we are inviting investment from industry and research from the textile, (bio) engineering technology, design, architecture, building and agricultural sectors. WMP-RL provides a steady supply infrastructure of materials (wool coats, jackets and raw wool), sorting and preparation expertise, and garnet machinery with a capacity of converting 10 tons per day from garment to fiber. Our organization supplies years of award-winning experience in textile recycling and innovation, design research, and social entrepreneurship. Most importantly, we share with you, and provide the passion and drive to deal NOW with massive global textile waste on all our doorsteps.

To contact us for further information regarding investment and partnership opportunities, or are curious how you can participate in the making of woolly futures, please contact us at:
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