

FORESTS FOR FASHION FASHION FOR FORESTS

When Sustainable Forest Management
Meets Sustainable Fashion Trends



UNITED NATIONS



UNECE



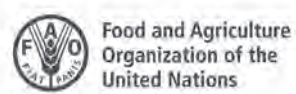
Food and Agriculture
Organization of the
United Nations



cittadellarte
FONDAZIONE PISTOLETTO



cittadellarte fashion B.E.S.T.
Bio Ethical Sustainable Trend



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THIS PUBLICATION WAS JOINTLY PREPARED BY
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ACKNOWLEDGEMENTS

The Forests for Fashion - Fashion for Forests event was organised by UNOG, the UNECE/FAO Forests and Timber Section, jointly with Cittadellarte - Fondazione Pistoletto.

The event was possible thanks to the enthusiastic engagement of many people and their organisations, who all contributed to its success:

United Nations Office at Geneva (UNOG)

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Security: Captain André Chapuis, Captain Olivier Jaguenaud, Lieutenant Christophe Loison, Lieutenant Claude Gallemand, Lieutenant Franck Malandre, Lieutenant Jack Vandenboomen and their team.

Cultural Activities: Sandrine Hegelbach, Clisse Ramos, Lea Suter.

Administration: Stephen Farrell, John Habonimana, Emmanuelle Simon.

UN TV: Emmanuel Hungrecker, Andrew Martin, Bernard Vansillette.

United Nations Economic Commission for Europe (UNECE)

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Food and Agricultural Organization (FAO)

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UNECE/FAO Forestry and Timber Section

Paola Deda, Maria Teresa Pisani, Paolo Cravero, Arnaud Brizay, Matt Fonseca, Anvar Nigmatov, Nina Peeva, Dominique Reeb, Florian Steierer, Karen Taylor, Elina Warsta, Frank Helbig, Roman Michalak, Sebastian Glasenapp, Anastasia Zakharova.

Cittadellarte - Fondazione Pistoletto and its Bio Ethical Fashion Trend (B.E.S.T) platform

Michelangelo Pistoletto, Margherita Cugini, Alessandro Lacirasella, Roberto Melis, Paolo Naldini,

Olga Pirazzi, Juan Sandoval, and their team.

The designers and artists

Cecilia Granara, Doris Kloster, Erica Stefani, Damien Beal, Flavia La Rocca, Florinda Guadagna, Laura Strambi, Margherita del Balzo, Marita Huurainen, Marta Antonelli, Marta Forghieri, Natures of Conflict, Roberta Redaelli, Silvia Massacesi, Silvio Betterelli, Stefano Ughetti, Tiziano Guardini.

Permanent Mission of Finland to the United Nations Office and other international organizations in Geneva

H.E. Päivi Kairamo.

Permanent Mission of Italy to the United Nations Office and other international organizations in Geneva

H.E. Maurizio Enrico Luigi Serra, Eleonora Lucangeli Serra, Simona Battiloro.

Permanent Mission of the Russian Federation to the United Nations Office and other international organizations in Geneva

H.E. Alexey Borodavkin.

Permanent Mission of Switzerland to the World Trade Organization and the European Free Trade Association

H.E. Remigi Winzap, Minister Marc Wey, Felix Wertli.

The Swiss Agency for Development and Cooperation (SDC)

Jürgen Blaser.

Swiss Federal Office for the Environment (FOEN)

Christoph Dürr, Sibylle Vermont.

R V R Service AG, Clean Forest Club

Fabienne Marti, Armand Rudolf von Rohr.

Centre de formation professionnelle, nature et environnement

Gilles Villanova and his students.

Lenzing AG

Carlo Covini, Lorenz Wied.

Programme for the Endorsement of Forest Certification (PEFC) International

Sarah Price.

Centre d'Art Contemporain Genève

Andrea Belini, Laura Györik Costas, Inès Flammarion.

ART AND DIPLOMACY UNITE FOR MORE RESPONSIBLE FASHION

Michael Møller, Director General, United Nations Office at Geneva (UNOG)
Michelangelo Pistoletto, Artist



When Michael Møller, the head of international diplomacy in Geneva, and Michelangelo Pistoletto, one of the world's greatest living artists, met for the first time at the Forests for Fashion - Fashion for Forests event at the Palais des Nations in March 2014, it was an event of international importance. They soon realised they shared a common vision for the responsible transformation of our society. And they came to the conclusion that there was a great deal the United Nations and the world of art and culture could do together to bring this to fruition.

Mr. Møller and Maestro Pistoletto told us more about their vision:

Michael Møller: Every year at the United Nations we celebrate the International Day of Forests. It is a time to reflect upon and remind everyone of the crucial role that forests play in humanity and life on earth. It gives freedom to explore meaningful ways of using this amazing resource, while preserving it for the generations to come and preventing the unnecessary destruction of what is essential. We needed inspiration, an idea that speaks a universal language, that touches our souls and gives us direction. Michelangelo's concept of "Rebirth" was the perfect solution.

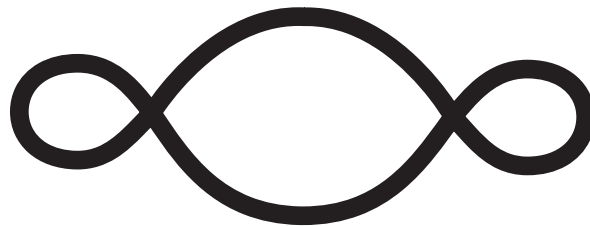
Michelangelo Pistoletto: I believe the symbol of Rebirth is key to understanding not only the modern world, but also the ideal world that we are striving to attain. The extremities of this conceptual symbol represent the conflicting parts of our world, while the centre represents the place where opposing forces can find harmony and work together. It is very similar to the work that the United Nations does in bringing people together, opening dialogue and fostering cooperation.

Michael Møller: That is exactly what Forests for Fashion - Fashion for Forests was about: giving two different, and often opposite, worlds — the man-made world of fashion and the natural one of forests — the opportunity to talk, exchange ideas and lessons learned, and be mutually supportive. These two worlds can be beneficial or detrimental to one another; it is up to us to lead the way to harmonious coexistence.

Michelangelo Pistoletto: Forest is nature. Fashion is artefact. The way we dress delivers a message of metamorphosis and a vision of the world. It is important to start from there. The Forests for Fashion - Fashion for Forests initiative, using Rebirth as its symbol, is the union of nature – our planetary *habitat* – and artefact – a mental *habitus* – in that place where sustainable fashion is possible.

Michael Møller: The United Nations acted as a catalyst for the formation of this union, and continues to work tirelessly to ensure that a sustainable world, where the man-made and the natural can coexist in total harmony, becomes a tangible reality.

Such a powerful dialogue led to many more ideas on how to work together towards a future of peace, human rights and well-being for all, and some of these will be developed through new joint projects between the United Nations Office at Geneva and Maestro Pistoletto with his trailblazing open center for creativity and responsibility, Cittadellarte.



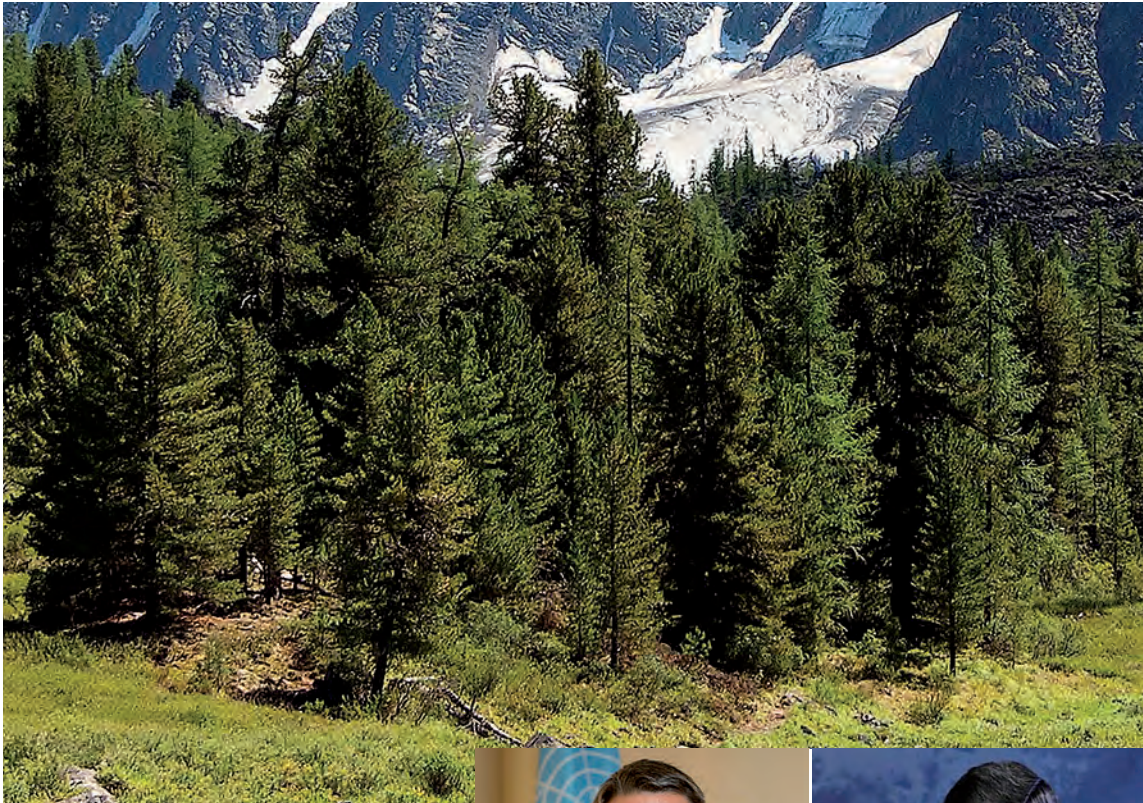




CELEBRATING OUR FORESTS AND THEIR ROLE IN GREENING FASHION

Christian Friis Bach, Executive Secretary, United Nations Economic Commission for Europe (UNECE)

Vladimir Rakhmanin, Assistant Director-General, Food and Agriculture Organization (FAO)



The United Nations General Assembly designated 21 March as the International Day of Forests to celebrate the importance of forests

and trees to all life on earth. Therefore, it is quite fitting that this day was chosen by the UNECE and the FAO in 2014 to showcase and discuss the role of forests in greening the world of fashion.

Why does this link between forests and fashion matter? Admittedly, forest-derived fabrics are still a small, although fast growing, percentage of the clothing industry, and constitute a tiny amount of the use of wood fiber from our forests. However, looking at numbers, business projections, and the market's ever-increasing awareness of sustainability, we think that this is just the beginning of something much larger.

The global fashion industry is valued at about 1.7 trillion dollars and employs more than 75 million people¹. Almost half of global fabric production consists of cotton fibers and the majority of the remainder is made up of synthetic materials, which are derived from fossil fuels.

With increasing concern over the misuse of limited water resources, the environmental toll from extensive use of pesticides, and the issues surrounding the use of fossil fuels, using wood fibers from sustainably-managed forests makes a lot of sense.

The UNECE-FAO Forests for Fashion - Fashion for Forests event, featuring key players from both the forest and fashion worlds, is precisely what is needed to find solutions to the pressing issues of sustainability. We trust that this initiative will open new doors to further dialogue and a cross-pollination between sustainable industries in both sectors.

As all States and all stakeholders share the responsibility for the implementation of the 2030 Agenda for Sustainable Development, we cannot ignore the pivotal role of fashion industries and businesses - large, medium and small - in ensuring sustainable consumption and production patterns. Our sustainable fashion initiative shows that it is possible, in practice, to maintain the natural capital of our forests while using it sustainably for products that are safe for both humans and the environment.

A famous humourist and author² once said, "Clothes make the person. Naked people have little or no influence on society". There is truth in this statement. People notice what you wear and, given the challenges that we all face in maintaining our fragile environment, it is perhaps time to take note of the role that forests can play in our clothing.

1. Fashion United. Available at: www.fashionunited.com/global-fashion-industry-statistics-international-apparel

2. Mark Twain, AKA, *Samuel Langhorne Clemens* (30 November, 1835 – 21 April, 1910).

EVERYONE TALKS OF SUSTAINABLE DEVELOPMENT, BUT WHO IS REALLY WALKING THE TALK?

Paola Deda, Chief, UNECE/FAO Forestry and Timber Section



Sustainable development has become an increasingly common term in both national and international policies. It is high on the UN agenda, is advocated for by a large number of NGOs, and is backed by numerous countries. But this concept is slow in penetrating below the surface of people's daily lives, and is even slower in becoming a driving factor for businesses.



Promoting sustainable production and consumption patterns is not easy. Not only does it require solid political will and commitment, but also communication and outreach strategies that touch upon every level of society, changing priorities, habits and unsustainable practices.

One of the main challenges for this change is not necessarily its affordability, but rather people's awareness of the issue and the possibility of choosing between different products and lifestyles. People and businesses must be shown that the transition towards a 'green economy' is not only beneficial to our planet and our lives, but that it is also economically viable and profitable.

Forests already play, and will continue to play, an increasingly crucial role within this paradigm shift from unsustainable to sustainable development.

They provide many essential functions with which we are all familiar: preserving biodiversity, storing carbon and mitigating climate change, providing water collection, clean air, and creating green jobs and providing environmentally friendly products. However, there are other lesser-known wood-derived products. Thanks to technological innovations, forests have become the source of high-performance products and components found in the electronic, automotive and fashion industries.

The Forests for Fashion – Fashion for Forests event aimed to shine a spotlight on this issue, demonstrating how innovative forest fibers, while being both fashionable and highly marketable, have the potential to contribute to a greener economy. Many of the clothes we wear every day are made from both traditional and revolutionary types of wood-derived textiles, such as Lyocell/Tencel® and rayon. These are cellulose fibers produced from wood pulp, which are widely used in the fashion industry due to their smooth texture, strength and more sustainable production chain.

Fashion is not always sustainable. It often promotes excessive and unsustainable consumption, is affordable only to the richest parts of society, frequently uses materials that are not ecological and, in many instances, thrives on unethical work conditions.

Through the contribution of experts from different fields—from forestry to haute-couture to art—it was possible to show that, when it comes to the use of materials, for instance, the fashion world could embrace more sustainable patterns and more ecological choices while still maintaining a profitable value chain. This would actively contribute to making our economy greener and, ultimately, our world a better place.

This paradigm shift was represented by the “Rebirth” symbol, developed by renowned Italian artist Michelangelo Pistoletto, who played a crucial part in developing the above event. This design epitomizes the alliance between nature and technology, the rebirth of a society that fosters a greater harmony between humankind and nature.

The Forests for Fashion - Fashion for Forests event, the “Rebirth” symbol and, more generally, our work at the UNECE/FAO are all reminders that the future starts with the sustainable management of forests. It then continues up the value chain to sustainable production and consumption.

Only when forests meet fashion, is sustainable development truly possible.





CITTADELLARTE'S MISSION

Paolo Naldini, Director, Cittadellarte - Fondazione Pistoletto



PARTNERSHIP WITH UNECE

In 2013, Cittadellarte set up a partnership with the United Nations Office at Geneva (UNOG), and with the UNECE (United Nations Economic Commission for Europe) through its UNECE/FAO Forestry and Timber Section.

The partnership between these organisations, so different in size and origins, is based on the *commitment to assume unlimited responsibility* and



work together to promote a culture of sustainability and responsibility which safeguards the planet's natural resources, and forests in particular.

The UNECE recognises that art has great potential for communicating and setting trends, and could therefore contribute to making the message of sustainability more attractive and successful than most of the usual approaches.

However, the world of fashion is not generally linked with responsibility. Thus, for fashion to become sustainable and responsible we need a cultural metamorphosis, entailing not only an innovative interpretation of fashion, but also a commitment to putting sustainability into practice.

CITTADELLARTE FASHION B.E.S.T. AND FORESTS FOR FASHION - FASHION FOR FORESTS

In 2009, Cittadellarte created the B.E.S.T., Bio Ethical Sustainable Trend platform, a laboratory that brings together companies from the fashion supply chain (from spinning and weaving mills through to end-market labels). This laboratory is a teaching, production, research, outreach, seminar and event planning centre. It attempts to make sustainable fashion extremely appealing, not only as a passing trend, but as a deep-rooted and established tendency. Its objective is to turn the fashion sector into a champion of sustainability.

In March 2014, UNECE and Cittadellarte collaborated in the organisation of Forests for Fashion - Fashion for Forests, an event which showcased and included clothes, sculptures, trees, conferences, performances and dance.

The clothes were created by a pool of young fashion designers educated in sustainability and capable of using viscose and other fibers derived from forests.

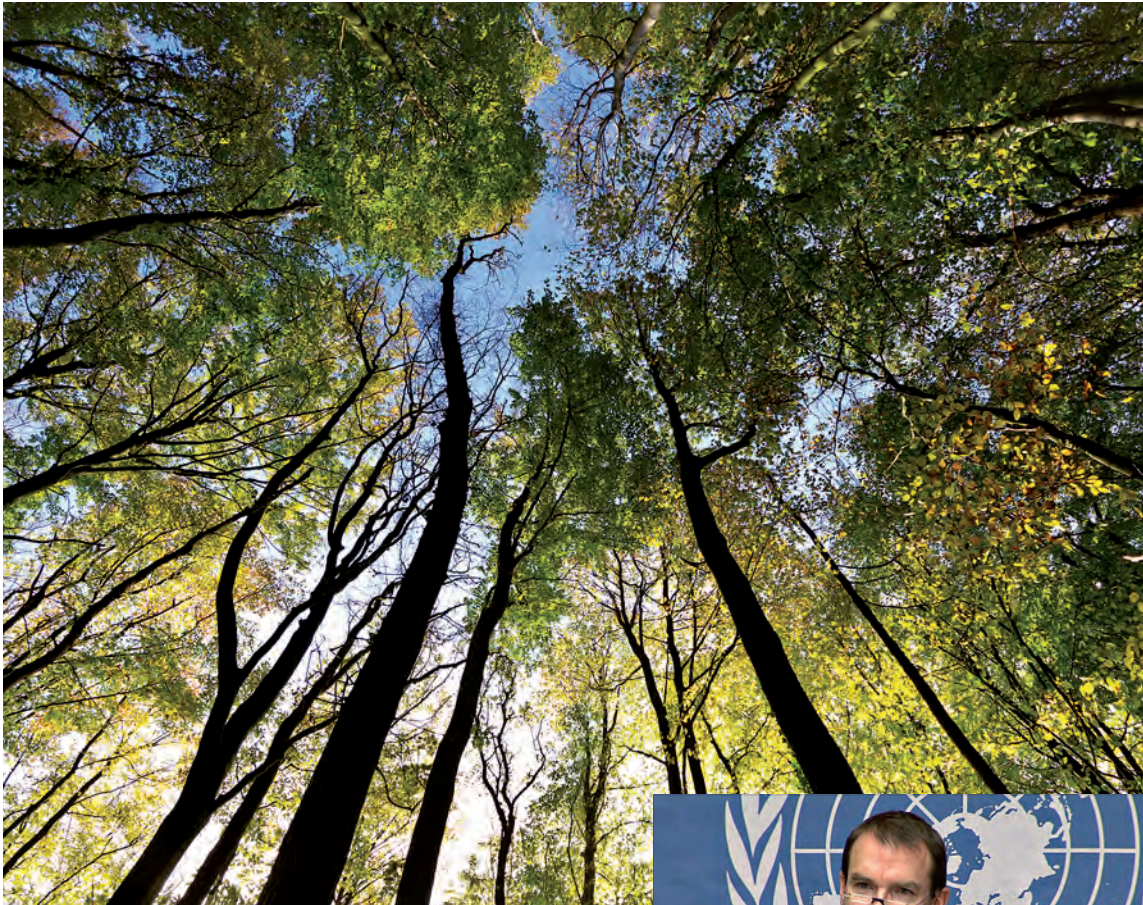
The initiative, as you can see from the photographs contained in this volume, led to a catwalk, with dancers modelling items of clothing designed specifically for the occasion; a flash mob in the Plainpalais square in the centre of Geneva which saw the participation of the city's schools; and a conference in one of the halls of the Palais des Nations which involved representatives from the whole supply chain.

THE FUTURE

The UNECE/Cittadellarte partnership, in collaboration with UNOG and the Permanent Representation of Italy in Geneva, intends to propose a programme which includes research, initiatives and events with the main leaders of the sector (global labels, fashion designers, the National Chamber of Italian Fashion, the Textiles and Health National Authority, etc). This programme is inspired by the sculpture Rebirth, a site-specific installation of about 40 metres by 20 metres, made of 193 roughly cubic stones, each representing a member country of the UN, which will be a permanent feature in the gardens of the Palais des Nations in Geneva.

FASHION: A RISKY BUSINESS FOR FORESTS THAT CAN BE MANAGED

John Scanlon, Secretary General, Convention for the International Trade in Endangered Species (CITES)



If asked the question “how risky can the fashion industry be for biodiversity of forests” the answer would surprisingly be: “very risky”.

Many risks can be associated with the fashion production cycle – including the use of raw materials sourced from the plants and animals that live in forests. The risks to biodiversity are not only confined to the fashion industry, but also extend to: furniture made from rosewood timber, medicines made from the bark of the African Cherry tree, cosmetics made from the wax of the candelilla plant, just to cite but a few. The risks for biodiversity and forests depends, ultimately, upon how well both the risk itself and forests are managed.

There are many instances in which fashion trends have posed a threat to biodiversity and forests. One of the best examples comes from the UK. In the early 1900s, during a period known as the “Plume Bloom”, millions of wild birds were killed for their feathers, which were used for making hats. To provide an idea of the magnitude, a single order of feathers by a London dealer in 1892 included 6,000 birds of paradise and 40,000 hummingbirds.

The “Plume Bloom” took place before international trade in wildlife was regulated, and it was not until the 1960s that an international debate got underway on the need to regulate such trade. After a long discussion and negotiation, in 1973 the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was adopted. Today it includes 180 State signatories and it regulates international trade for more than 35,000 species of plants and animals to ensure that this trade does not endanger their survival.

CITES regulates the international trade of many species that are used in the fashion industry. A well-known example is pythons that are used for their skins – with trade volume valued at over USD 1 billion annually. Others include: the peccary, a small forest dwelling pig whose skin is used to make leather gloves; agarwood-producing trees, the extracts from this dark heartwood are used for fragrance products, with the essential resin being sold for up to \$80,000 per liter; and the musk deer, a forest mammal whose gland secretions were historically used in Chanel No. 5—today this scent is synthetically produced.

Trends come and go and we have seen a soaring demand for clownfish and owls (following their portrayal in popular movies).

With over 7 billion people inhabiting our planet, rising levels of disposable incomes and huge volumes of international trade, a species could be threatened by a fashion trend very quickly.

To avoid this scenario, we need well-regulated international trade in plant and animal species that are (or could become) threatened in order to ensure that trade is legal, sustainable and traceable (and this is CITES). We also need to ensure that consumers are aware of the source of their fashion products to enable them to make informed choices.

Fashion does pose a risk to biodiversity of forests, but this risk can be managed. The fashion industry is receptive, consumers are increasingly well-informed and there is an active NGO community. We are seeing greater commitment by the fashion industry to sustainable practices throughout the value chain.

WHAT FORESTS AND FASHION CAN LEARN FROM EACH OTHER

Kit Prins, Consultant and Former Chief, UNECE/FAO Forestry and Timber Section



It is not common knowledge but, in general, forests in Europe, Russia and North America are managed sustainably. This is as a result of the general prosperity and stability of the regions, established institutions, the knowledge of foresters, and the efforts of society to generate consensus on the objectives of forestry. This overall positive picture in the richer countries is, unfortunately, overshadowed by the ongoing tragedy of tropical deforestation in less well-off countries, driven mostly by domestic factors—notably, competition for land with agriculture for export goods (palm oil, soya, beef), and the demand for cheap timber.



However, there are threats to the sustainability of rich countries' forests too. These can be grouped under three main categories: climate change and other damage (fire, game, insects, etc.); conflict about objectives (biodiversity or recreation? Revenue for rural people or wood supply for forest industries?); negligence (smallholdings and bad economics leading to forests which do not fulfil their potential, and which, in some cases, decline).

A further threat is the decline in demand for wood due to major technological and social trends, such as modern materials for packaging and construction, and IT and internet replacing the paper used for databases and newspapers. As wood is the major source of income for forest owners, this is a threat to the economic sustainability of forest management.

However, those who manage forests and forest industries, despite being acutely conscious of such threats, have not been very dynamic or innovative in responding to them. This is where fashion comes into its own: the fashion sector is unquestionably dynamic and innovative, fast moving and creative, tuned to its clients' wishes and, at the same time capable, of guiding them effectively, with very large profit margins compared to the average forest enterprise.

The forest sector, however, also has some lessons for the fashion industry. These were learned in the 1980s when forest managers had to respond to the strong criticism waged against them by environmental NGOs and, indeed, all concerned citizens. Such criticism is not that dissimilar to that occurring in the fashion sector where the focus is on cheap and badly protected labour and unsustainable environmental practices.

Since then, the forest sector has learned the hard way to be more positive and proactive, and is happy to share these lessons:

- Nothing can happen until the actual situation is acknowledged.
- Everyone in the chain, right up to the consumer, must be involved in the discussion.
- It is possible to devise instruments to create consensus, monitor progress and build trust. In the forest sector we have national forest programmes and criteria, and indicators of sustainable forest management, based on serious (and expensive) statistical effort. A standard definition of "sustainable fashion" is needed with regards to the raw materials used, the social conditions of the workforce, the economic viability of fashion enterprises, the greenhouse gas profile, among others.
- Independent certification and full traceability are possible. The Programme for the Endorsement of Forest Certification (PEFC) and the Forest Stewardship Council (FSC) logos on forest products in supermarkets around the globe seem to have gained consumers' appreciation and trust, and are no longer viewed with suspicion thanks to major efforts by everyone, and facilitated, but not imposed, by governments.





REBIRTH AND THE ART INSTALLATION AT THE PALAIS DES NATIONS

The Tree of Rebirth at the Palais des Nations can be seen as the tree of life.

“Rebirth” is the symbol of life because it merges two opposite poles, and where they meet in the centre they create a third element, that of vital energy.

This is the same vital energy that we find in nature itself, and we can link artifice with nature through the research we have been carrying out.

The connection between the artificial world we have created and the existing natural world is tomorrow’s world, its birth, and its continuous rebirth as symbolised by the tree.

The tree represents rebirth because it germinates, it grows, and it dies, and the forest represents this endless regeneration: fallen leaves feed the new tree, and, in this way, death generates new life, the circle of life in nature.

The symbol of Rebirth becomes a metaphor for life through its connection with the tree, chosen to represent the concept of nature and the forest as continuous regeneration.

The installation consists of the Rebirth symbol taking the shape of an enormous fabric-covered spider. Living trees will then be planted, surrounding the “spider”, in the garden of the Palais des Nations.

A spider was chosen because it weaves, and this is its link to fashion.

The weaving spider represents Rebirth and this Rebirth is surrounded by trees, themselves an expression of nature and therefore regeneration.

Thus the fabric Rebirth surrounds the symbol of life, i.e. the tree (of life).

Rebirth presents regeneration as sustainability, responding to the theme of the event: sustainable fashion, created with sustainable material and fabrics.

Through its installations, art has always developed meaningful symbols, giving life a sense of dynamics and constant motion. In the same way that the Renaissance gave us a perspective of the past, Rebirth gives us that of the future.



THE ART PERFORMANCE AT PLANPALAIS



On 21 March 2014, Pistoletto presented Rebirth performed by 500 students on the Plainpalais square under the direction of Genevan choreographer Prisca Harsch (Cie Quivala).





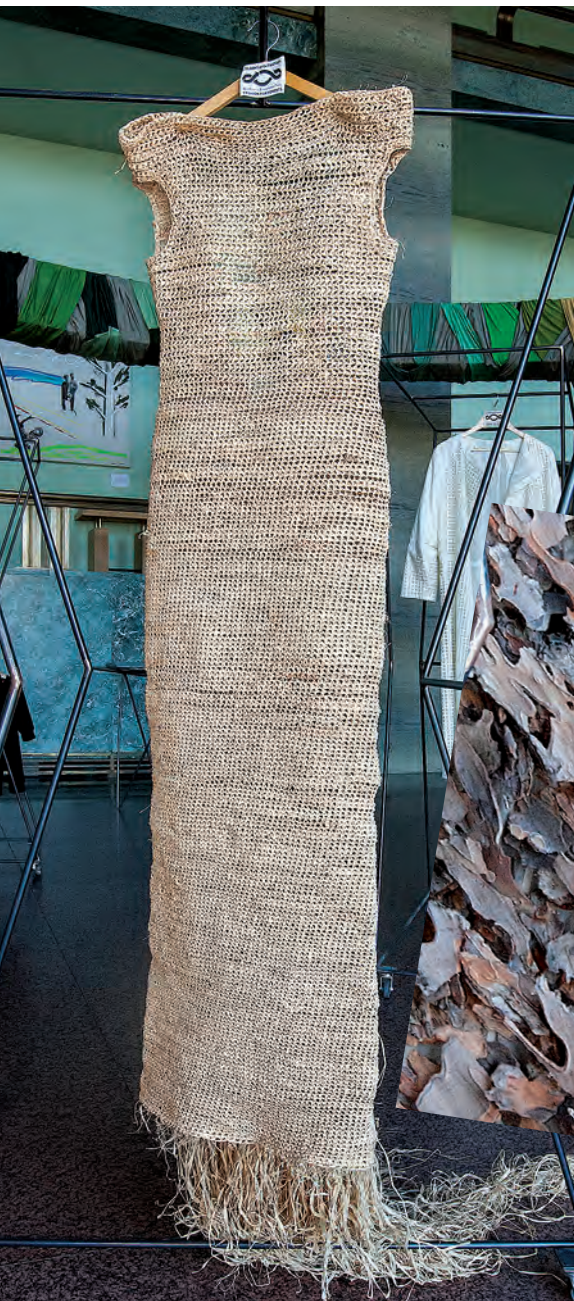
HOW A DREAM OF A FOREST INSPIRED MY DRESSES

Tiziano Guardini, Fashion Designer



The mist begins to fade as day breaks and illuminates the forest. But just before darkness gives way to day, winds from different directions blow softly through the trees, embellishing and adorning Mother Nature, she who gives life. Another day has begun. This was the vision, the dream, that led me to conceive of and create a dress made of bark, so delicate and fragile when worn or transported. This dress is part of a project that I am developing, which originates from the depths of my soul and conjures a dream where one reverts to a stronger, almost fantastical, bond with nature. When creating, I believe that it is crucial to understand one's true feelings and to be able to communicate them by transforming an idea into reality using one's intuition to mould impalpable thoughts into physical realities. In this process I try to merge the tradition of haute couture, experimentation and my vision of Mother Nature. There is a theory that clothes are like our second skin. This same theory says that this second skin, like our first one, is a crucial medium through which we communicate what we believe in, both to others and to ourselves. Wearing these clothes is like stating that we believe





in a more sustainable, natural and ecological approach to fashion. This was the concept I wanted to express through the dresses presented at the Forests for Fashion - Fashion for Forests event. The dresses made from rigid materials—like bark straw and liquorice roots—are referred to as sculptural. Yet they are soft, delicate, wearable creations that demonstrate how fashion can go hand-in-hand with nature.

Seeing my creations exhibited at the United Nations, and endorsed by the Cittadellarte - Fondazione Pistoletto, further confirmed that this is the direction in which both fashion and my work should go.

My aim now, after exhibiting at the Palais des Nations in Geneva, is to bring this message of sustainability and fashion to a larger audience, creating a new, more wearable collection that reflects the same values.

It is time for fashion, sustainability and forests to coexist and support each other.



A STEP IN THE RIGHT DIRECTION: THE SUSTAINABILITY MANIFESTO FOR ITALIAN FASHION

Mario Boselli, Honorary President, Italian National Chamber of Fashion



In line with the new market awareness of the need for a greener economy, fashion is moving in this direction, seeking to combine style, quality, ethics and sustainability. The fashion industry is breaking away from the past to transition towards a more eco-friendly future, where what we wear is both fashionable and sustainable.

The Italian National Chamber of Fashion has adopted sustainability as a programme objective. It created a working group that drafted the Sustainability Manifesto for Italian Fashion. The Manifesto demonstrates how to achieve sustainability at each step of the value chain, while focusing on synergies between environment, sustainability and competitiveness.



Developed with input from key players from the fashion sector in Italy, the Manifesto is structured around ten principles:

- 1. DESIGN:**
design quality products that last, thus minimising their impact on ecosystems;
- 2. THE CHOICE OF RAW MATERIALS:**
use raw materials and textiles having a high environmental and social value *in terms of respect for the environment as well as for human and labour rights*;
- 3. PROCESSING OF RAW MATERIALS AND PRODUCTION:**
reduce the environmental and social impacts of processing and production activities and acknowledge everyone's contribution to the value of the final product;
- 4. DISTRIBUTION, MARKETING AND SALES:**
include sustainability criteria at every stage of the product's journey towards the customer;
- 5. MANAGEMENT SYSTEMS:**
be committed to the on-going improvement of business performance;
- 6. FASHION AND NATIONAL PRODUCTION SYSTEM:**
support the community, as well as Made-in-Italy products;
- 7. BUSINESS ETHICS:**
integrate universal values into your brand;
- 8. TRANSPARENCY:**
communicate to stakeholders, in a transparent way, your commitment to sustainability;
- 9. EDUCATION:**
foster ethics and sustainability with consumers and all other stakeholders;
- 10. MAKING THE MANIFESTO A LIVING DOCUMENT.**

The Manifesto was first presented in September 2012 at the opening of Fashion Week in Milan, where it received considerable support from sector operators. In January 2013, it was officially endorsed by the Italian Ministry of Environment.

The Italian National Chamber of Fashion intends to persevere in its efforts towards sustainability by co-ordinating with major fashion brands and by organising events to communicate, to exchange ideas and lessons learned, and to engage in open debate. Our goal is to make the Manifesto a living document by promoting its culture on both the demand and supply sides: sustainable production from businesses and conscious consumption by consumers.

Forests for Fashion - Fashion for Forests was an important initiative that contributed to raising awareness on issues related to forests, the environment and fashion.

We hope that these initiatives—Forests for Fashion - Fashion for Forests and the Sustainability Manifesto for Italian Fashion, among others—will result in a cultural shift which will provide for the integration of ethics and sustainability into the fashion world.

CITTADELLARTE FASHION B.E.S.T.

Bio Ethical Sustainable Trend



Cittadellarte was created in Biella in the 1990s, on the initiative of Michelangelo Pistoletto, as a new type of artistic and cultural institution where **art in direct interaction with the different sectors of society**. It now represents the meeting point of people from the four corners of the globe who are the protagonists of a commitment to creatively change ways of living, coexisting and surviving in any sector of work or activity, from entrepreneurship to education, from research to activism, from architecture to agriculture.

Cittadellarte's social **mission** is embodied in **Rebirth**.

Its fundamental vision of *art as the driving force of a social transformation*, though not in contrast with tra-

ditional art, represents the true avant-garde when compared to the academies. The latter present a type of art which can be self-referential, detached from reality, difficult to understand, influenced by the market and without a real vision for its own future or that of humanity.

Cittadellarte Fashion B.E.S.T. is an operative workshop which has been committed to the development of sustainability within the textile industry since 2009, gathering together dozens of fashion companies that produce sustainable fabrics, yarns and accessories. It coordinates meetings and events promoting sustainable consumption, takes part in international work groups, and organises seminars and educational studies.

It was born of the cross-pollination of socially responsible art and a world of fashion looking for a new model of ethical and sustainable development.

It acts and interacts at many levels with the major stakeholders in the world of fashion, bringing creativity and innovation: from design to production, from distribution to communication.

It focuses on three essential principles:

- the productive excellence of the Biellese territory and the world renowned Made in Italy,
- Cittadellarte – Fondazione Pistoletto's inherent artistic creativity,
- a commitment to the transformation of society in a responsible and sustainable way.

Cittadellarte Fashion B.E.S.T. relies on a team of designers who, from the very beginning, created a place of work, exchange and sustainable research. The combination of various differences between art and fashion enhances this group, developing fruitful interaction between fashion designers and producers.

In March 2014, B.E.S.T. collaborated with the United Nations Office at Geneva on the occasion of a major event dedicated to sustainability: "Forests for Fashion - Fashion for Forests", with an artistic installation by Michelangelo Pistoletto, a series of performances at the Palais des Nations and in the city's squares, and a working conference with major international stakeholders.

A group of designers created clothes and accessories for a fashion show using materials from the companies of the B.E.S.T. platform, thus generating international visibility for them.

They were:

MARTA FORGHIERI, *Italy*

SERIENUMERICA, *Italy*

SILVIA MASSACESI, *Italy*

CAMO, STEFANO UGHETTI, *Italy*

SILVIO BETTERELLI, *Italy*

NATURES OF CONFLICT, *Austria*

FLAVIA LA ROCCA, *Italy*

WHAT SUSTAINABILITY MEANS TO DESIGNERS

Silvio Betterelli, CAMO, Marta Forghieri, Flavia La Rocca, Silvia Massacesi, Natures of Conflict, Laura Strambi, Designers
Olga Pirazzi, Cittadellarte - Fashion B.E.S.T., Fashion-Show Coordinator



“Forests for Fashion - Fashion for Forests” featured a memorable art and dance performance under the symbol of *Rebirth*, with dancers wearing clothes and accessories made of forest-derived fabric and materials. A group of talented young designers, who believe fashion can be kinder to our planet, created them for the event. The following are some of their comments:



SILVIO BETTERELLI: In designing my dresses I constantly explore the relationship between fabric, shape and body. It is about original creations that challenge the rules of traditional modeling and couture. “Forests for Fashion - Fashion for Forests” allowed me to do this using innovative and functional fabrics, which are also ethically responsible and sustainable. The result was a series of pieces of “demi couture” that look towards the future which, in today’s world, equates with “being sustainable”.







CAMO: CAMO is the abbreviation of “camouflage”, which means masked, disguised. The purpose is not to dress people, but to put them in touch with what they wear. CAMO creates a contemporary uniform: it uses materials produced with very specific goals and attitudes, draws from the world of uniforms and extrapolates its codes, subverting them, making them suitable for the current context. The products made for “Forests for Fashion - Fashion for Forests” are totally ecological and respect the coexistence of humankind and nature. The whole line, from the materials to the manufacturing, was entirely produced by CAMO, under the Made in Italy logo. We were very proud to be a part of this superb joint project of the United Nations and the Cittadellarte – Fondazione Pistoletto.





MARTA FORGHIERI: To me, sustainable means ever-lasting; it is the opposite of fast fashion. For this project I wanted to create modern comfortable pieces using top quality materials, with a classically sporty look. “Fashion for Forests - Forests for Fashion” gave me the opportunity to demonstrate my interpretation of sustainable fashion.





citadellarte fashion
Bio-Ethical Sustainable Text
FASHION FOR FORESTS

citadellarte fashion
Bio-Ethical Sustainable Text
FASHION FOR FORESTS

citadellarte fashion
Bio-Ethical Sustainable Text
FASHION FOR FORESTS

ARTEEZ



FLAVIA LA ROCCA: For The Capsule collection, presented at the “Forests for Fashion - Fashion for Forests” event, I decided to work mainly with organic fabric, using contrasting white stitching on shirt dresses and skirts. The aim was to give contemporary and casual appeal to these modular pieces, while maintaining the femininity of the collection. I was inspired by the idea of a young, dynamic woman who wants to play around with her style and go green.





SILVIA MASSACESI: My “eco-chic” handbags are made of natural cork and recycled cellulose fiber, and combine Italian tradition with the latest technological innovations, research and respect for the environment. The bags are 100 per cent locally-made and are assembled manually following a unique and innovative technique, in order to make them durable, resistant and waterproof. This new method enables the embellishment of the front and back of the bags with modern geometric designs, which highlight the colour contrast created between the two materials.





NATURES OF CONFLICT: When the United Nations and Cittadelarte asked us about our collections made from wood fibres, we were thrilled. By pure coincidence, we had used only Tencel® and Tencel® cotton mixtures for the Spring/Summer 2014 collection. Since we concentrate on local production, we use Tencel® as the fabric factory we work with is situated in Upper Austria. Using this fabric ensures a locally-based production-chain from the raw material to the end product, as Tencel® is entirely produced in our country, Austria. We were very happy to present our collection at “Forests for Fashion - Fashion for Forests” at the Palais, and to give a glimpse of our commitment to sustainable fashion to the sector.





LAURA STRAMBI: I have been working on sustainability and respect for the environment for a long time, as I strongly believe that humankind has a huge responsibility towards the planet. I use ecologically-friendly and sustainable materials and products that fulfil “save the water” criteria. My collections are made exclusively using ethically-produced materials which are made from organic fibres and are dyed using natural colours. Each item of the collection is “unique”, completely handmade through every step of the extensive process of designing, cutting, sewing and dyeing. This is my green fashion universe, where I express my creativity in a mix of art and design, while remaining environmentally aware and responsible. It was in this spirit that I joined the “Forests for Fashion - Fashion for Forests” initiative.





“FORESTS FOR FASHION - FASHION FOR FORESTS”- A YOUNG STUDENT’S PERSPECTIVE

Nethmi Karunajeewa, Student, *International School of Geneva, Campus des Nations*



On 11 April, together with other students of the International School of Geneva’s Fashion Design Programme, I went to the “Forests for Fashion - Fashion for Forests” exhibition at the Palais des Nations. To me, the key purpose of this exhibition was to raise awareness of the fact that people’s choices affect the environment, and to spread the message that we, as inhabitants of this planet, can make choices even in areas such as fashion, which will affect our planet’s sustainability.

The exhibition consisted of clothing and accessories made out of plants and wood found in forests. Even the colour scheme relied heavily on the colours of nature: browns and greens.

Some of the objects in the exhibition were particularly fascinating: the wooden, high-heeled shoes, the handbags made of cork, and the very beautiful dress made of intricately woven liquorice branches and roots.

The “Forests for Fashion - Fashion for Forests” exhibition was very inspiring for us. We, too, aim to create clothing and accessories that help make the world more sustainable by being completely made from recycled materials. Our creations were exhibited at the “Recycled Fashion Show” organised by the school last June at the Campus des Nations. It was a great success.





HIGHLIGHTS FROM THE CONFERENCE FORESTS FOR FASHION - FASHION FOR FORESTS

Geneva 21 March 2014

MODERATORS

Dominique Reeb, Deputy Chief, UNECE/FAO Forestry and Timber Section
Paolo Naldini, Director, Cittadellarte - Fonazione Pistoletto

COORDINATOR

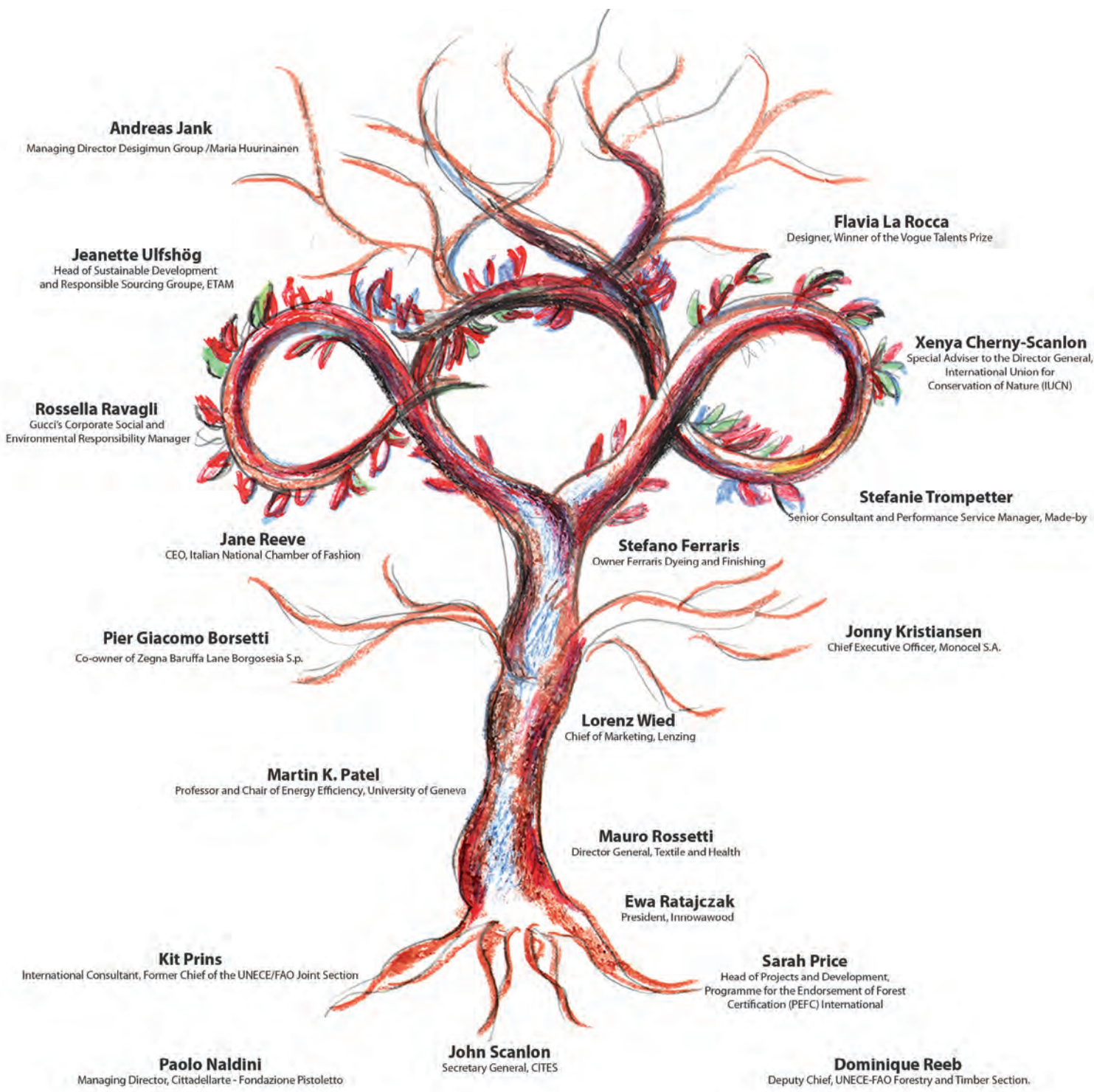
Maria Teresa Pisani, Economic Policy Officer, UNECE/FAO Forestry and Timber Section



“**S**ustainable fashion has an image problem, and the problem is that it has no image.”

So said **Xenya Cherny-Scanlon**, Special Adviser to the Director General, International Union for Conservation of Nature (IUCN), and author of the “Green Stiletto” blog, in one of many memorable quotes. She went on to say that sustainable food has a relatively high public profile, with brands like Fairtrade, in spite of its problems, being known to many people. Most consumers, however, have no idea whether their clothing is sustainably sourced, or of the working conditions under which it was produced.

The issue of the image of forestry was taken up by **Ewa Ratajczak**, former President of InnoVAWood, who pointed out that it is seen as a low-tech industry. Wood industries spend a low proportion of their budget on research and development compared with most other industries, although this has increased in recent years.





Paolo Naldini, Director, Cittadellarte - Fondazione Pistoletto, **Dominique Reeb**, Deputy Chief, UNECE/FAO Forestry and Timber Section, **Heikki Granholm**, Chair, UNECE Committee on Forests and the Forest Industry, **Rob Busink**, Chair, FAO European Forestry Commission.

With specific reference to the fashion industry, with less than 5 per cent of fabrics being cellulose-derived (and not all of those derived from wood), wood is not currently a significant player, reflected in the fact that only 1 per cent of wood harvested is used for fashion, although this figure is growing at a rate of 5 per cent annually.

Clearly the forest/fashion partnership is in its infancy, but its potential was extolled by **Paolo Naldini**, conference moderator, who emphasized that fashion and forestry have much to learn from each other. The forest sector can learn from fashion in terms of innovation, customer orientation and speedy adaptation, but fashion may also learn some lessons from the forest sector, when it comes to sustainability, traceability and legality

Kit Prins, International Consultant, former Chief of the UNECE/FAO Forestry and Timber Section, elaborated on the sustainable/legal argument, using the example of criticism of the fashion industry by environmental agencies and NGOs, notably on the sustainability of cotton. He argued that the experience of the forest sector, which weathered similar censure in the 1980s concerning harmful and irresponsible management practices, may be useful here. During that period, foresters learned that criticism must be faced head-on and not ignored, which leads to an acceptance of the actual situation. Following which, everyone involved in the supply chain must be involved in decisions, so that consensus can be reached and consumer trust regained.

However, non-sustainable practices may involve consequences more severe than criticism from environmentalists, as **John Scanlon**, Secretary General of the Convention on International Trade in Endangered

Kit Prins, International Consultant, former Chief of the UNECE/FAO Forestry and Timber Section, **John Scanlon**, Secretary General, Convention on International Trade in Endangered Species (CITES), **Sarah Price**, Head of Projects and Development, Programme for the Endorsement of Forest Certification (PEFC) International.





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Species (CITES), showed. The survival of whole forest species may be at risk, as in the 'plume boom' of the early 1900s, when over 6,000 birds of paradise and 40,000 hummingbirds were killed during the 'Fashioning Feathers to Murderous Millinery' period. This shows that the fashion industry, which is six times the size of the forest industry, can not only drive unsustainable use of raw materials but can even contribute to the extinction of a species. The work of CITES currently covers over 400 timber species, and has led to changes in sustainable use of products. For example, the peccary, an over-exploited forest species, now provides a sustainable livelihood for local people through the manufacture of leather gloves. Similar work has been done with other forest products: agar wood resin and python skin, for example. Whilst much of this work is outside the UNECE region, it nonetheless indicates major progress for forests and fashion.

The point about the financial consequences of lack of sustainability was taken further by **Stefanie Trompetter**, Senior Consultant and Performance Service Manager, Made-by, who referred to sustainable clothing brands, such as the H&M Conscious collection. If a pragmatic brand like H&M is getting involved in sustainability and making a serious investment in it, it is not because of warm fuzzy feelings, but because of the need to protect its reputation. With the increased vigilance of consumer organisations, unsustainable fashion runs the risk of scandals, like the recent tragedy of the fire in Bangladesh which revealed disturbing evidence of the conditions under which many clothes are made. A sustainable brand, with well-sourced materials, is partially protected from consumer fall-out from such an event, and labels like 'Fairtrade', even when erroneous, protect companies which used them in good faith.

Ms. Trompetter also made the point that sustainability can be a very complicated concept. For example, use of recycled plastics to create products seems sustainable, but may not be if the plastics did not need to be used in the first place, for example for bottled water.

Jane Reeve, Former CEO, Italian National Chamber of Fashion, took the point about the image problem a stage further. Sustainable fashion could be seen by some companies as restrictive and burdensome, an unnecessary cost, whereas it should be seen as adding value by building the reputation of the brand as well as the loyalty of consumers. She said that the industry should embrace the merging of ethics with aesthetics, and cited her experiences in monitoring the huge Italian fashion industry as an example.

This theme was further developed by **Rossella Ravagli**, Gucci's Corporate Social and Environmental Responsibility Manager, who talked about how seriously this very prestigious brand is taking the sustainability issue. Starting in 2004 with a voluntary sustainability certification process, Gucci has gone on to show its commitment by attaining SA8000 and ISO 14001 certification. Clearly a company as famous and successful as Gucci would only take these steps if they made sound economic sense, as outlined by the two previous speakers.

Other speakers from the fashion industry included **Pier Giacomo Borsetti**, Co-owner, Zegna Baruffa Lane Borgosesia S.p.A, an Italian company that produces high-end woollen products. They have, as part of their prestigious brand, carefully ensured a sustainable supply chain for their high-quality worsted and wool products.

Less traditional product creation was represented by **Lorenz Wied**, Chief of Marketing, Lenzing SA, and **Jonny Kristiansen**, CEO, Monocel S.A. The latter gave an interesting example of a sustainably-sourced product from outside the UNECE region. Monocel® is a bamboo-derived product which is organically produced in sustainable wild forests. It is produced using the lyocell process, a much simpler and less chemical-reliant process than the old viscose process, requiring only 1/72nd of the water needed to produce an equivalent amount of cotton. Questions from the audience revealed that a similar approach could possibly be used to create fibre from birch within the UNECE region.

Mr. Wied, from Lenzing, a major Austrian producer of fibre from wood cellulose, explained the difficulties of increasing production. All wood-derived fibres need sophisticated setups to start production, requiring massive investment in factories. For example, in 2011, a new viscose plant cost €150 million, and took three years to construct. His company produces viscose; the more modern, stronger fibre, Modal®, as well as its more recent (20 years old) fibre, Tencel®, produced using the lyocell process. Tencel®, in particular, has an excellent environmental footprint,

1. **Stefanie Trompetter**, Senior Consultant and Performance Service Manager, Made-by,
2. **Jane Reeve**, Former CEO, Italian National Chamber of Fashion,
3. **Rossella Ravagli**, Gucci's Corporate Social and Environmental Responsibility Manager,
4. **Lorenz Wied**, Chief of Marketing, Lenzing SA,
5. **Ewa Ratajczak**, former President of InnovaWood,
6. **Pier Giacomo Borsetti**, Co-owner, Zegna Baruffa Lane Borgosesia S.p.A,
7. **Mauro Rossetti**, Director General, Textile and Health,
8. **Francesco Ferraris**, Owner, Ferraris Dyeing and Finishing S.p.A.
9. **Martin K. Patel**, Professor and Chair of Energy Efficiency, University of Geneva.



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with no additional chemicals used in its production, and 99 per cent of waste products being recycled.

However, while this is a good example of a sustainably-produced fabric, creating the fibre is only the first in a number of stages. **Mauro Rossetti**, Director General, Textile and Health, an overseeing/certifying organisation in Italy, explained that chemicals introduced during the finishing process may damage the environment, or the health of the wearer. For example, a recent Italian study showed that 7/8 of paediatric dermatological diseases were caused by chemicals used in the production of footwear. There is a clear need for a sustainable, transparent production chain, guaranteed by certification, with known companies and materials used in the chain, guaranteed free from hazardous chemicals. The connection with personal health is an interesting one, and may be an easier 'sell' for sustainable fashion than environmental protection.

A good example of a sustainable form of the textile finishing process was given by **Francesco Ferraris**, Owner, Ferraris Dyeing and Finishing S.p.A. He explained that production of the fibre itself accounts for less than 1 per cent of the cost of the finished fashion product. A higher proportion is accounted for by the finishing and dyeing of the cloth, traditionally high-pollution industries. In recent years, Ferraris has been an industry leader in addressing this concern, using measures such as daily water analyses. He also pointed out that huge discounts at points of sale favoured cheap, less sustainable products.

Flavia La Rocca, Designer, Winner of the Vogue Talent Prize, developed this theme, demonstrating how commitment to sustainable fashion meant having to find out, for example, where the lace she uses is sourced, not just in terms of fibre and finishing, but also manufacture and transport, and how difficult this can be in practice. Sustainability is a strategic decision, however, and, even if a business function is outsourced, the responsibility for sustainability is not. **Andreas Jank**, Co-owner, Marita Huurinainen Design, a Finnish sustainable fashion design house, added to the discussion on sustainable sourcing, including the controversial but sustainable idea of fur products from forest animals which have been culled to protect the environment.

The difficulty of measuring the 'sustainability index' of such long and elaborate production chains was taken further by **Martin K. Patel**, Professor and Chair of Energy Efficiency, University of Geneva. He reminded everyone that the process chain for fashion was much longer than those they may be more used to with forestry. Not all of these processes have the same environmental impact, so some form of weighting would have to be used, about which there would doubtless be long and difficult debates. Even at conference level, problems already arose, as two delegates argued that, while wool may feature low on a 'league table' of sustainable fibres, it is a by-product of the meat industry and therefore a much more sustainable, non-polluting product than it may initially appear.

With all the above difficulties, it was apparent that the popularity of cotton, with 25 million tonnes produced in 2005, is a problem. It is one of least sustainably-sourced fibres currently available, largely due to the amounts of pesticides used in its production. Fossil-fuel-derived synthetic fibres also have a poor sustainability record, and are even more popular, with 35 million tonnes being produced in the same year. By way of comparison, that year, only 3 million tonnes of bio-refined cellulose fibres were produced, not all of which would have been derived from wood.

Despite these difficulties, it was generally agreed that some form of certification would be needed to ensure the survival of forests involved in the fashion industry, as well as to reassure the consumer. **Sarah Price**, Head of Projects and Development, Programme for the Endorsement of Forest Certification (PEFC) International, explained how certificates work with long supply chains, from eco-labelling of source materials and treatment of producers and workers, to transport costs in exporting the finished product. This has led to greater transparency in the fashion industry, as well as increased safety for workers. In addition, a brand is reinforced by being able to communicate its 'product story' to journalists and consumers, who are uninterested in statistics.



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Jeanette Ulfshög, Head, Sustainable Development and Responsible Sourcing Group, ETAM, emphasized the point about the need for certification, not least to get the sustainable issue out of the way for consumers, who will generally make their buying choices based on cost and preference. A certificate will not sell a garment, but lack of one could cause it to be avoided.



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Finally, **Xenya Cherny-Scanlon**, whose quote headed this summary, continued this theme, arguing that, as there are currently only 600 sustainable brands, a tiny number in the fashion industry, marketing must take place at the top level. Designers will be persuaded to create inspiring garments from fabrics which are firstly beautiful and useful, and, only secondly, sustainable. Initiatives such as the Green Carpet Challenge at the Golden Globes, Oscars and the Cannes Film Festival, have been taken up by Emma Watson, of the 'Harry Potter' films, and other celebrities. They have collaborated with iconic design houses in highlighting 'Sustainable Style' at these events, winning widespread media acclaim, not just because the garments are sustainable, but because they are stylish and beautiful. The message is, 'Be good, and look good'. All sustainable fashion messages should resemble this - simple and positive, not talking exclusively about sustainability - because fashion should be fun. 'Sustainable Style' should simply be the minimum that everyone aspires to: so that, to quote this speaker again, "Unsustainable is so last year!"



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1. **Flavia La Rocca**, Designer, Winner of the Vogue Talent Prize, 2. **Andreas Jank**, Co-owner, Marita Huurinainen Design, 3. **Jeanette Ulfshög**, Head, Sustainable Development and Responsible Sourcing Group, ETAM, 4. **Xenya Cherny-Scanlon**, Special Adviser to the Director General, International Union for Conservation of Nature (IUCN) and author of the "Green Stiletto" blog.



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INNOVATIVE WOOD-BASED PRODUCTS: TEXTILES

UNECE/FAO FOREST PRODUCTS ANNUAL MARKET REVIEW, 2013-2014

Douglas Clark, Lead author,
Peter Aurenhammer and Asta Eder, Contributing authors
Florian Steierer and Matthew Fonseca, UNECE/FAO Forestry and
Timber Section, Coordinators

Forests for Fashion also inspired the focus of the Innovation Chapter of the UNECE/FAO Forest Products Annual Market Review, 2013-2014. The event highlighted that forest fibers are taking over the market and growing fast.

HIGHLIGHTS

- Viscose, a wood-derived fibre, comprises 6% of the global fibre market. It occupies third place in that market, after synthetics and cotton and ahead of wool.
- While traditional viscose has many environmental flaws, modern wood based fibres can be considered as the most sustainable of the world's four most commonly produced fibres.
- The sustainability credentials of wood-derived fibres are further enhanced by new forms such as Tencel® and “wet modulus” viscose, which have relatively green production systems, as well as by the development of less-damaging “closed loop” systems for existing wood-derived fibres.
- More than 90% of wood-derived fibres are produced outside the UNECE region (primarily in Asia), although much of this production is in European-owned factories.
- Wood-derived fibres are a close substitute for cotton: the frequent cotton crop failures from 2004-2012 led to record price increases for wood-derived fibres as well as substantial investment in new manufacturing capacity.
- Several researchers theorise that a “cotton peak” may already have been reached, in which case the production of wood-derived fibres may grow significantly in order to meet increasing demand for naturally derived skin- and environmentally-friendly fabrics.
- Innovation in wood-derived fibres is improving the outlook for their use. For example, Tencel® (produced by the Austrian Lenzing Group) is a strong, machine-washable, sustainably produced fibre; it is likely to see increased worldwide demand for use in both woven products and “non-wovens” (e.g. wet wipes and mattress stuffing), with an increased production base in Europe.
- The UNECE organized the “Forests for Fashion” event in March 2014, which gathered together producers, researchers and journalists and showcased wood-derived fabrics in a highly successful and innovative display.
- Recommendations from the Forests for Fashion event are reflected in this chapter and include: raising public awareness of sustainable fibres; building vertical and horizontal links among sustainable producers and finishers; creating certification methods to reassure consumers; and addressing the issue of fabric waste and reclamation.

1.1 INTRODUCTION

This chapter focuses on developments in the wood-derived fabrics industry and their implications for the production of sustainable clothing. At present, modern wood-derived fibres represent the only potential source of sustainable clothing. Reclamation from current production (recycled fibres) can help, but it cannot fully meet the needs of the expanding world population. With likely future limitations on the supply of fossil-fuel-derived oils for the production of synthetic fibres, the environmental downsides of cotton, and a lack of other viable alternatives (for example, hemp and soya currently constitute only a tiny proportion of world fibre supply), dissolved-pulp fibres – both innovative and traditional – offer the greatest hope of a sustainable clothing material sufficient to meet global needs.

The popularity of fibres has tended to be inversely proportional to their sustainability (Patel, 2014); historically, the market share of natural fibres has decreased over time compared with artificial fibres (The Fiber Year, 2014). Synthetic fibres, which are made from fossil fuels using environmentally damaging processes, are the most popular fibres worldwide, with over 61% of the global fibre market; their popularity can be explained by their low prices, colour-fastness and durability. The second most popular fibre, with 31-32% of the global fibre market, is cotton, which is grown in very large monocultures and is a major user of pesticides, which can be environmentally damaging. Cotton production and processing also involves the consumption of large quantities of fresh water, an increasingly scarce resource (Hämmerle, 2011). The production of “organic” or “clean” cotton has been attempted, but such cotton accounts for less than 1% of current cotton sales and its production still uses large volumes of water (Dirksen, 2008).



Source: Lenzing, 2014.

In third place in the global fibre market, with 6% of global market share (well ahead of the next-most-popular fibre, wool, which accounts for less than 1% of the global market), is a wood-derived product: viscose. Viscose is produced using a pulp-dissolving process to extract cellulose (a substance that comprises 40-50% of wood). The extracted cellulose is treated chemically in various ways depending on the desired end-product and mechanically spun into threads to create viscose. The basic process for viscose production was invented in the nineteenth century and is used successfully to create a cheap artificial silk known as rayon. “Viscose” is the generic name for the overwhelming majority of products produced in this way worldwide; its properties are given later in this chapter (table 3.3.2) in a comparison with other, more modern wood-derived fibres.

Because there is no outstanding patent on viscose, it remains by far the most commonly produced wood-derived fibre worldwide. Viscose comes in a variety of subtypes, generally determined by the trees used in its production.

1.2 ENVIRONMENT

There are several problems with viscose's "green" credentials. Production is relatively energy intensive compared with cotton: the production of 1 kg of viscose fibre consumes as much or more energy as cotton. Moreover, carbon disulphide, the most commonly used solvent in viscose production, is highly toxic. In older viscose plants, more than 50% of the carbon disulphide used is released into the air. The production of rayon in the UNECE region must comply with clean-air and clean-water regulations, and some producers, notably in the US, abandoned the industry rather than retool. Outside the region, however, rayon production may continue to be environmentally damaging (Batra and Blackburn, 2011).

In its basic form, moreover, viscose is not a machine-washable fabric, meaning that some viscose products may need to be dry-cleaned – not usually regarded as an environmentally friendly cleaning method. On the other hand, high-wet-modulus viscose, a product developed in the 1960s, retains much of its strength when wet and is suitable for machine washing (Textile Exchange, 2014).

The development of high-wet-modulus viscose, and other advances in production methods, means that newer forms of viscose can be considered the most environmentally friendly of the four most common fibres in production today. Table 3.2.1 shows the quantities of water, land, chemicals and energy required to produce lyocell fibres (another form of rayon and a wood-derived fibre), viscose, cotton and polyester, and the greenhouse gas emissions associated with the production of each; it shows that lyocell and viscose perform much better than cotton on almost all measures and much better than polyester in energy demand and greenhouse gas emissions.

TABLE 3.2.1

Environmental effects of fibre production

	LYOCELL	VISCOSE	COTTON	POLYESTER
Water demand (1,000 l/kg)	0.1	0.25-0.5	7-20*	0.13
Land demand (m ² /kg)	17-66	17-66	66-200	...
Chemicals demand (g/kg)	345	...	350	...
Energy demand (MJ/kg)**	20-45	20-60	20-40	70-97
Greenhouse gas emissions (CO ₂ -eq/kg)	-0.25-0.3	0.9-1.6	2.2-4.4	4.1-4.5

Notes: * if irrigation is needed. ** non-renewable primary energy.

Source: Kalt and Zauner, 2001; Shen and Patel, 2010.

The environmental friendliness of viscose production is being further enhanced by Lenzing (Austria), Birla (India) and other companies in the UNECE region, which, to comply with anti-pollution laws, are using “closed loop” systems to ensure that toxic chemicals are re-used and do not escape into the environment.

1.3 MARKETS

1.3.1 PRODUCTION

Approximately 4 million tonnes of pulp-derived viscose is being produced annually worldwide. The UNECE region accounts for 370,000 tonnes (just under 10%), of which Lenzing produces the lion's share (Lenzing, 2014b). Most of Lenzing's recent 100,000 tonne increase in capacity was driven by exports, because European demand for viscose is generally in decline. This decline is being partly offset by the fast-expanding “non-wovens” industry, in which viscose is the preferred fibre for wet wipes, hygiene products, surgical applications, mattress stuffing (Lenzing's Tencel® fibre was developed for this), heat insulation, sound absorption and aerosol filtration (Jahangiri, 2013). Fifty-eight per cent of global viscose capacity is in China, where 27 plants each produce an average of 75,000 tonnes annually; increases in China are planned by Lenzing and the Indian company Birla. Chinese demand for viscose products is high and growing (Bywater, 2011), China is also the single biggest producer and consumer of dissolved pulp (graph 3.3.4), the source of viscose. South and Southeast Asia produce approximately 900,000 tonnes of viscose per year, which is nearly one-quarter of global production. Birla is the leading producer in these subregions, producing 650,000 tonnes annually. In Indonesia, South Pacific Viscose, which is owned by Lenzing, produces more than 200,000 tonnes annually. While local demand is high, nearly 50% of the viscose produced in South and Southeast Asia is exported, mainly to Turkey but also to China and Western Europe.

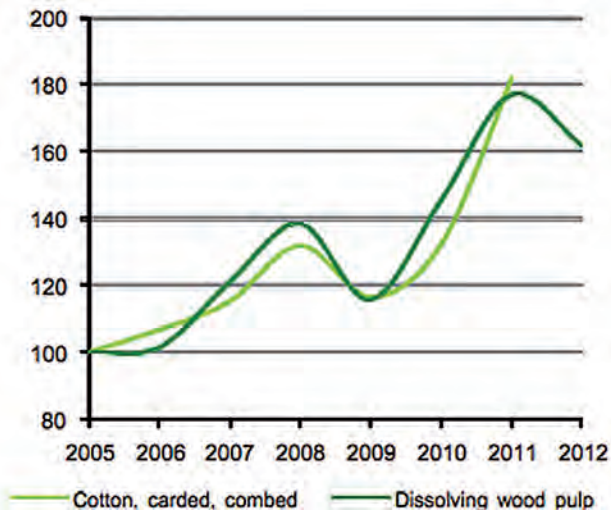
The rest of the world (i.e. excluding the UNECE region, China, South and Southeast Asia, and India) produces only 220,000 tonnes of viscose per year (less than 7% of global production). Viscose production has largely ceased in eastern Europe and North America but is growing in Brazil, Japan and Taiwan, Province of China. Birla plans to increase its global production of viscose to one million tonnes by 2020 and to this end is building a plant in Egypt (Bywater, 2011).

1.3.2 PRICES

Globally, the major planned and actual increases in viscose production capacity could cause volatility in the viscose market, with the attendant risk of a drop in price (Johard, 2013). Generally, however, viscose fibre is a close substitute for cotton and its price correlates closely with cotton prices (graph 3.3.1). Increases in the price of viscose in recent years to record levels were due largely to widespread failures of cotton crops in 2004–2012. In turn, the increase in viscose fibre price led to an increase in the price of commodity dissolving pulp (Stone, 2013).

GRAPH 3.3.1

**Global export prices
of dissolving pulp and cotton,
2005-2012**



Note: Export price indices.

Source: FAOSTAT, 2014.

Led by this price boom, world production of viscose grew by 84% between 2004 and 2012, with most of the new production capacity installed in China, whose share of global production increased from 38% to 61% in the period. In turn, China's viscose fibre production has been the major driver of global demand for commodity dissolving pulp. Global dissolving pulp capacity nearly doubled between 2008 and 2013, increasing by 3.1 million air-dried metric tonnes.

Although the viscose boom that arose as a result of the cotton slump (and a rise in oil prices) looks to be coming to an end, cotton prices could rise in the long term because of conflicts over water use, insecticides and taking productive land away from cultivation of food crops, which have already led to export restrictions in India and Pakistan, two of the largest cotton-producing countries.

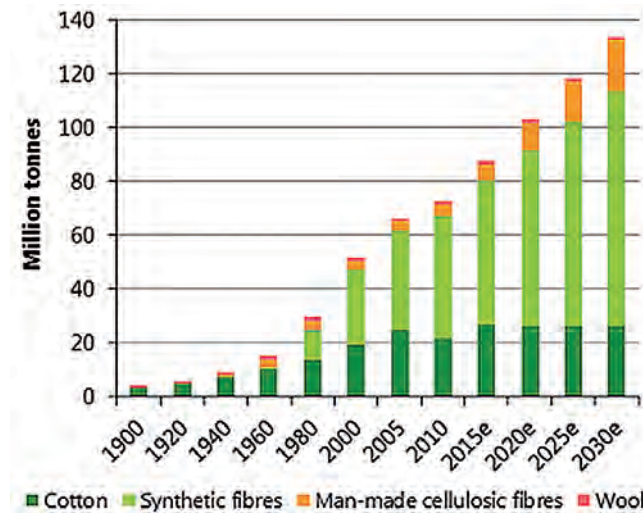
On the other hand, the cotton industry has dealt with similar problems in the past by gains in production efficiency (Johard, 2013).

Lenzing has based its corporate strategy on projections of future trends in viscose production; these refer to a "cellulose gap" in which demand for good-quality cellulose-derived fibres cannot be fulfilled by current supply (Lenzing, 2014a). The implication is that, for as long as the cellulose gap continues to increase, it will be profitable for existing firms to expand production and new firms to enter the industry.

The gap is expected to increase to 3.3 million tonnes by 2020 (Lenzing, 2014c). Lenzing expects

growth in cellulose-based fibres (overwhelmingly viscose) to nearly double in the five years to 2020, while the production of cotton is not expected to grow significantly because of limits to the availability of land and water (graph 3.3.2).

GRAPH 3.3.2
**Development
of filament and fibre consumption,
1900-2030**



Notes:

e = future estimates and based on assumption that cotton is at peak production, i.e. reaches maximum potential for cultivation.

Source: Hämmerle, 2011.

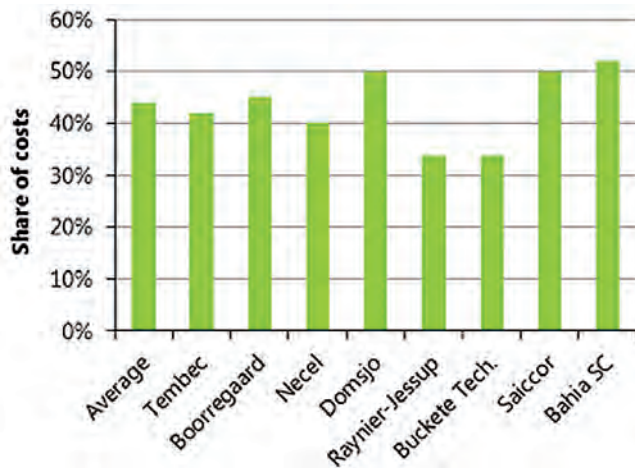
1.3.3 RAW MATERIALS

The yield of dissolving pulp (35%) is lower than for all other commercial uses of wood pulp, and there is a considerable advantage to be gained in locating plants close to wood sources in order to limit transport costs. In a review of the costs of eight international producers, Stone (2013) found that, on average, wood fibre represented 44% of the total cost of dissolving-pulp production (graph 3.3.3).

For those dissolving-pulp producers that must import a significant part of their wood fibre, cost structures are closely tied to the prices of imported wood.

GRAPH 3.3.3

Wood fibre's share in the production costs of dissolving pulp (2010)

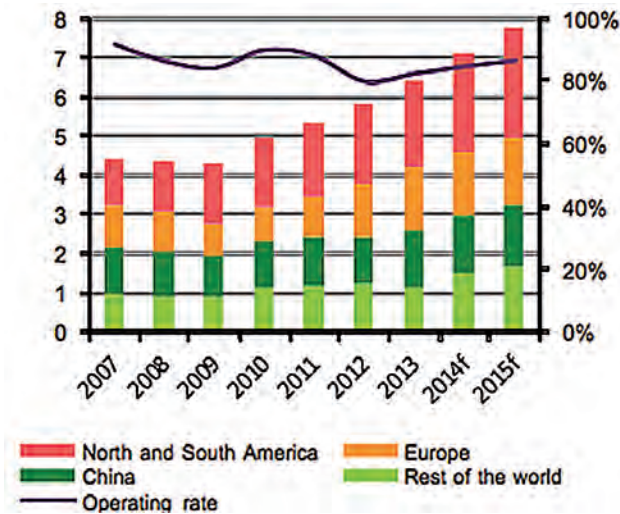


Source: Stone, 2013.

Graph 3.3.4 shows global production of dissolving pulp. China is the largest producer country. The operating rate (production capacity) is also shown.

GRAPH 3.3.4

Global production of dissolving pulp, 2007-2015



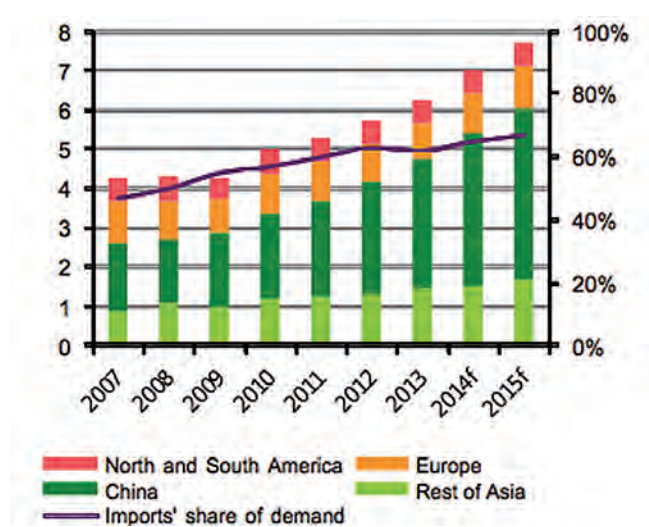
Note: f = forecast.

Source: RISI, 2014.

Given the Chinese dominance of this market, with the highest dissolving pulp demand (graph 3.3.5), it is interesting that the trend in China's wood import prices is upward. Unsurprisingly, China's dissolving pulp producers are at an increasing disadvantage when compared to dissolving pulp producers in timber-rich countries (such as many UNECE countries) because of the rising cost of their wood imports. The Chinese import price for wood chips and roundwood more than doubled between 2002 and 2012, to approximately \$100 and \$200 per m³, respectively (FAOSTAT, 2014; Stone, 2013), and Chinese labour costs are also increasing. The combination of these factors will affect Chinese dominance of the viscose market and may create opportunities for UNECE producers.

GRAPH 3.3.5

Global demand for dissolving pulp, 2007-2015



Note: f = forecast.

Source: RISI, 2014.

According to Schweighofer Fibre (Austria), prices for dissolving pulp were highly volatile in the period 2010-2013, fluctuating between \$1,000 and \$2,300 per tonne (Timber Online, 2013). Table 3.3.1 shows that the top exporters of dissolving pulp are South Africa, Canada and the US, while the largest importers, excluding Germany, are Asian countries; the table also illustrates the position of China as the leading importer (by far) of dissolving pulp and therefore the most vulnerable to increases in transport costs.

TABLE 3.3.1

Top net importers and exporters of dissolving pulp, 2012

(tonnes)

EXPORTER	NET EXPORTS	IMPORTER
South Africa	705,929	China
Canada	676,861	Indonesia
US	405,363	Germany
Brazil	390,600	India
Sweden	375,987	Thailand

Source: FAOSTAT, 2014.

In Austria, Lenzing buys only 35% of its wood locally. Previously, wood could be sourced from within 200 km, but the range has now increased to 800 km, partly because of increased production and partly because of increased competition for wood.

Conflicts of interest over raw materials may occur with other pulping/cellulose-based industries and the rural and industrial energy sectors, leading to higher prices (Isopp, 2012). Fabric producers are a high-value-added industry, making them more competitive in the market for cellulose given the low effect of raw-material price on end-product price.

The supply of wood is only part of the story, however, because fabric mills compete primarily for pulp rather than industrial roundwood, so their main competitors are conventional paper pulp mills rather than other timber users. There is a small price differential between pulp products (on average, pulp sells in the range \$200-\$250). The high price increases for dissolving pulp in 2007 and 2010 were due to increased demand from viscose fabric mills, which, in turn, were driven by the rise in cotton and synthetic fibre costs (the latter caused by rises in oil prices) (Johard, 2013).

1.3.4 NEW PRODUCTS

Table 3.3.2 lists some of the newer wood-derived products that could be described as “greener” alternatives to viscose. All these products are produced by Lenzing, and a number of other companies, notably Birla, have also produced similar second-generation wood-derived fibres.

Modal, a second-generation viscose product, can be machine-washed, although it is made by largely the same viscose process. Tencel®, yet another Lenzing product, made by a similar process to that for lyocell, is a truly “green” fabric because it uses environmentally friendly amine acid, which is wholly reclaimed at the end of manufacture. “Pipeline” products by other manufacturers, such a product in development in Scandinavia based on ionic solvents, also offer hope for the future (Aalto University, 2013). There may also be applications for the nano-crystalline cellulose technology already used by the paper industry (Government of Canada, 2013).

The British firm Courtaulds invented and invested in Tencel®, only to go bankrupt largely as a result; this is an illustration of how long it can take a new fibre to become commercially viable and of the risks involved in bringing new products to market. Lycra and Kevlar are examples of the (minimum) 10-15 year time span the product development process can take; neither modal, cupro nor lyocell fibres can be expected to be major world players in the next five years (Owen, 2012).

TABLE 3.3.2

Production process, characteristics and use of cellulosic chemical fibres

FIBRE	PROCESS, DISSOLVING METHOD AND SPINNING	TYPICAL MATERIAL CHARACTERISTICS	USE
Viscose	Pulp is dissolved in sodium hydroxide and carbon disulphide to gain spinning mass; uses wet-spinning method	Satisfactory dry strength, low elasticity, falls nicely, often gleaming, highly absorbent, fine, soft and skin-friendly	Blouses, dresses, interlining, clothes
Modal	Modified viscose process: other spinning conditions and amine oxide and the cellulose is dissolved in N-Methylmorpholine N-oxide; uses wet-spinning method	Similar to viscose; improved dry strength and much better wet strength	Often combined with cotton
Cupro	Copper oxide-ammoniac method: copper oxide-ammoniac used to dissolve pulp; uses wet-spinning method	Similar to viscose	Similar to viscose
Lyocell	Solvent-spinning method: dissolving pulp in a mix of amino oxide and water; very environmental friendly (non-poisonous, recoverable chemicals and water); wet-spinning method	Higher strength even higher than modal; otherwise, same properties like modal: high strength due to high chrySTALLINITY in the inner parts of the fibres, which causes fibrillation	Often combined with cotton

Notes: All these fibres are based on dissolved cellulose from pulp factories, and the final fibre substance is cellulose.

Source: After Ring, 2013.

Tencel® was launched by Courtaulds in 1992, but it still accounts for less than 10% of the output of Lenzing, its sole producer, and for only 0.5% of world production of wood-derived fibre (Stone, 2013). While the process to produce lyocell itself is not patented, Lenzing holds four separate patents necessary to spin and dye the resultant fabric and so will continue to be the sole producer of Tencel® for the foreseeable future (Lenzing, 2012). The process for dyeing Tencel® differs from cotton – it generally needs less dye but also reacts to particular dyes differently, which may create difficulties for an overwhelmingly cotton-focused finishing industry, as well as for fashion designers following the current vogue for designer-made digital prints (Owen, 2012).

1.4 POLICY ANALYSIS AND RECOMMENDATIONS

1.4.1 STATING THE PROBLEM

None of the greener products on the market is perfect. Viscose, by far the most popular wood-derived fibre, has its problems, notwithstanding the improved environmental standards being promoted strongly by companies such as Lenzing. A large number of “green” fibres, including viscose, are vastly superior to cotton and synthetics in terms of their environmental impacts (Patel, 2014). Lenzing for example was granted the EU Ecolabel for four of its six production facilities.

The discussion in section 3.3.2 showed that rising cotton prices benefited wood-derived fabrics and led to a boom in viscose production. It is also possible that increased awareness of the superior green

credentials of even the most old-fashioned of the wood-derived products could affect the market. The fashion industry is strongly influenced by public taste, and many fabrics have fallen out of favour simply because a trend has passed (this was the fate, for example, of “peach-textured” Tencel®-derived denim in Japan in the 1990s; Owen, 2012).

Awareness of the environmental impacts of different fibres is low among the general public: for example, many people think cotton is a “green” fibre because it is “natural”. Increased public awareness of the environmental impacts of different fibres would be to the advantage of wood-derived fabrics.

1.4.2 **LATERAL ALLIANCES**

Forestry is a small player in the huge fashion and fabrics industry. To increase the use of sustainable fibres, it may be necessary to make alliances with other producers, such as the manufacturers of organic cotton, hemp and bamboo-derived fibres. While these producers could be seen as competitors, their situation is similar to that of the wood-derived fabric industry, and they would benefit more from taking some of the market share of synthetics and commercial cotton than from fighting over the tiny market share they currently have. A united “green fabric” front, using the publicity generated by some of the newer fabrics, could make a greater impact than any one industry campaigning alone.

1.4.3 **VERTICAL ALLIANCES**

Generally, fabric price accounts for only 1% of the cost of a finished garment. The production of clothing involves a much longer process than is common in the forest sector: the fibre must be produced; woven; put through a variety of finishings to make it suitable to be worn next to the skin; dyed; and sewn into a garment (Isopp, 2012). The environmental credentials of the raw fibre are an important consideration, but a “green” fibre does not necessarily equate to a “green” garment.

To promote an unambiguous message of sustainability, vertical alliances are needed with production and finishing companies that are also aiming to reduce the ecological footprints of their products. In an excellent step in this direction, UNECE organized the “Forests for Fashion” event in Geneva, Switzerland, in March 2014. This event gathered together producers, researchers and journalists and showcased wood-derived fabrics in a highly successful and innovative display (UNECE, 2014). Such groundwork needs to be extended and turned into practical results if vertical alliances are to be effective.

1.4.4 **GREEN PASSPORT**

These lateral and vertical alliances could be put to good effect in promoting sustainable wood-derived fibres by creating recognizable labelling – a “green passport” for garments – showing how every stage in the process meets a certain standard. In addition to environmental credentials, such labelling would need to accommodate other issues, such as those associated with labour protection, because exposés of exploited or endangered labour can undermine an entire brand. A number of green labels are at various stages of development (EFF, 2011a), but the general public is wary of potential “greenwashing”. The sustainability forces in the fashion industry should work together to create a single, identifiable green passport that guarantees that each step of a garment’s production has been made to a measurable sustainability standard.

1.4.5 WASTE

If fabrics are to be promoted under a sustainability banner, the topic of waste fabric will need to be addressed, in the same way that it is nearly impossible to have a discussion about food without discussing food waste. Currently, all three of the world's most popular fibres are very cheap – people in the UNECE region have never had such good access to so much inexpensive clothing, and inexpensive, “disposable” clothing makes up the bulk of the fashion industry.

With such low costs, much perfectly good fabric is wasted at various stages of the production process because it is cheaper to discard than reclaim. At the consumer level, it is increasingly unusual for worn or damaged clothing to be repaired, and so large amounts of finished fabric are routinely discarded and destroyed, despite being a plentiful source of finished cloth (EFF, 2011b). This waste is both at the high end of the market, where labour-intensive, high-quality garments are only worn a few times before being discarded (or rarely recycled as vintage clothing), and at the lowest end, where cotton T-shirts and jeans are usually discarded once torn or stained.

Source: UNECE/FAO, 2014.

To an extent, producing more and cheaper green fabrics to be fed into a wasteful process would be environmentally friendly in only a nominal sense. Any of the alliances proposed above would also have to be seen to be taking action on fabric waste if they are to promote themselves under a sustainability banner.

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