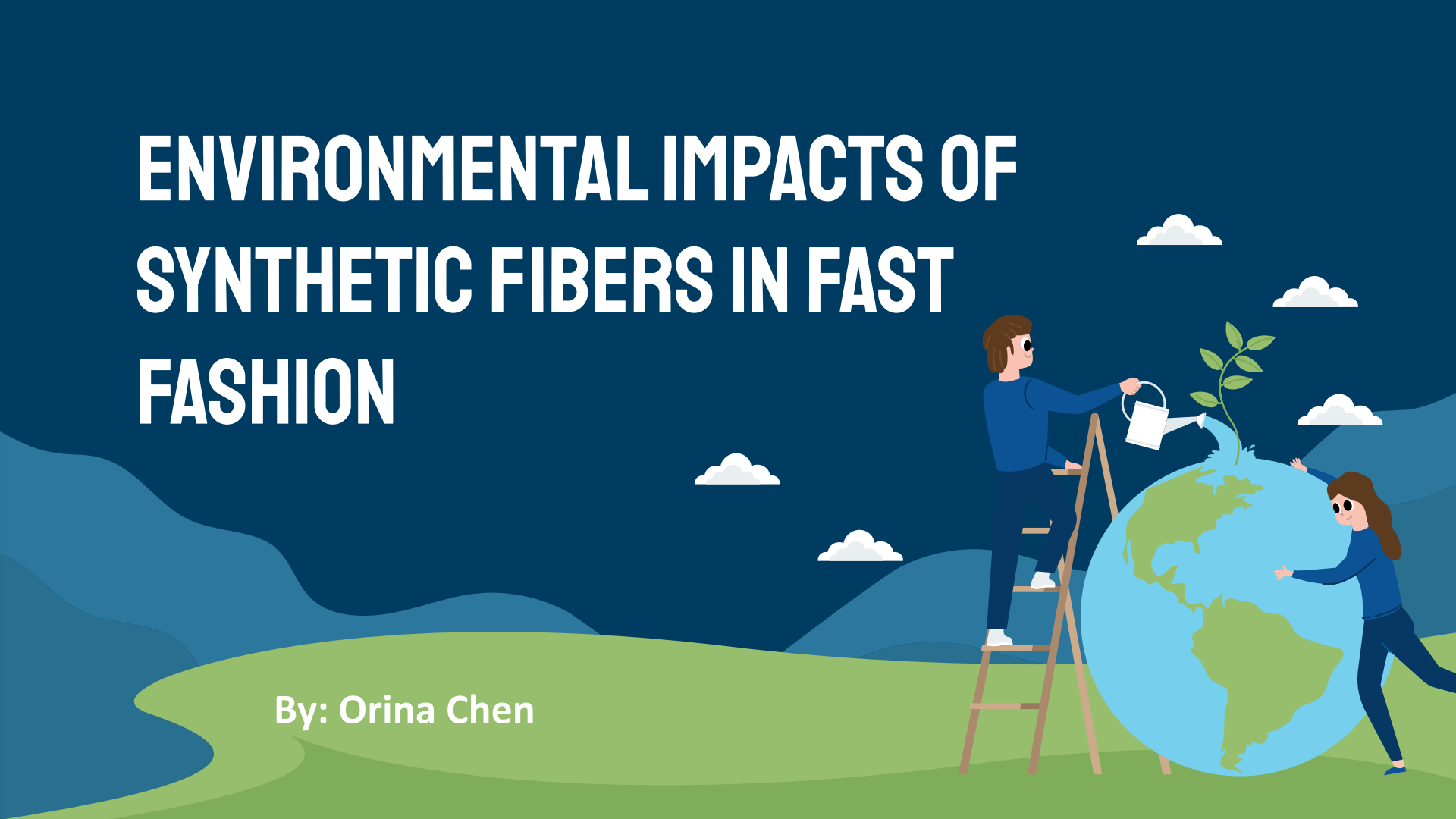
ENVIRONMENTAL IMPACTS OF SYNTHETIC FIBERS IN FAST FASHION



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WHAT ARE SYNTHETIC FIBERS?

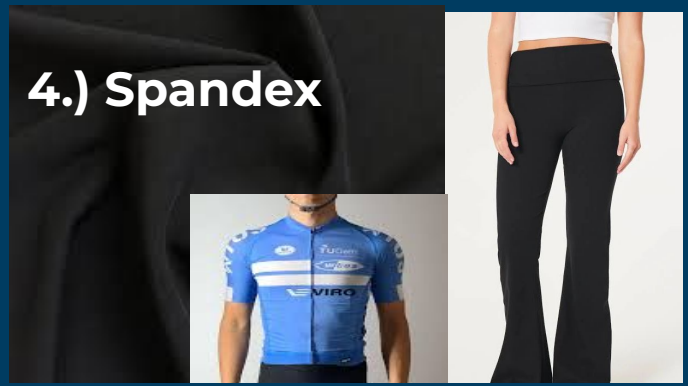
- Modern clothing is created from a diverse array of components, including **synthetic textile materials**, and natural fibers

- Synthetic textile materials are typically found in 4 primary fabrics: **polyester, nylon, acrylic, and spandex** (Wilson 2022**)**
  - Natural-based fibers —> **cotton, linen, wool** and **leather**...etc

Synthetic fibers are made of petrochemicals
  - Sourced from crude oil, a commonly known fossil fuel
  - Fossil fuels represent finite, **nonrenewable resources** (Wilson 2022)

In 2020, 62% of all fibers across fashion and fast fashion produced were synthetic-based (Wilson 2022)

4 PRIMARY FIBERS:



POLLUTION FROM SYNTHETIC FIBERS & FAST FASHION

EXPLOITATIVE LABOR & OCCUPATIONAL HAZARDS

WATER POLLUTION

- As of 2020. the fashion industry as a whole has generated **20% of global industrial wastewater** (Bailey et. al., 2022)
- Collectively, more than **1900 chemicals** play a role in textile production procedures (Bailey et. al., 2022)
- Untreated wastewater containing dyes **releases harmful toxins, and heavy metals into nearby water systems** (Bick et. al., 2018)
    - **Negatively affect** the well-being of both **animals and residents** in the vicinity
- Reusing wastewater effluents & water alkalinisation footprint method

Campus Sustainability Practices: VCU has implemented stormwater management programs to prevent runoff pollution and green infrastructure, such as **rain gardens, and bayscaping** to absorb and filter stormwater

Water Conservation Programs: VCU has also implemented water conservation measures such installing **water-saving fixtures**

MICROPLASTICS

Microplastics are **extremely small plastic particles** in our environment, categorized as less than 5mm long, that derive from waste or consumer products.

- From wastewater treatment plants (WWTPs), synthetic materials have notably gathered in the **marine ecosystem** (Cesa et. al., 2017)).
    - When ingested by marine animals, induce false fullness, irritation, and **digestive tract injuries**, **affecting fitness and reproduction**. (Cesa et. al., 2017)

- Subset of microplastics stems from household washes
    - Can **carry toxic chemicals** such as benzotriazole in polyester clothing, **negatively affecting human health** (Cesa et. al., 2017)

MICROPLASTICS IN DOMESTIC WASHINGS

- A single textile item can disperse more than **1900 microplastics** (defined by these authors as < 1 mm)

- Textile type and machine model could influence microfiber release
  - **Polyester-cotton** blend consistently **released fewer fibers** compared to pure polyester or acrylic sweaters, regardless of the washing conditions.
  - **Top-load machine types** are responsible for an **increase of 430% in the mass of fibers** released when compared to a front-load type.
    - Presence of a central agitator with higher cycle duration and water consumption, explains fibers weakening

- VCU has **implemented front-load laundry machine t**ypes across many dorms such as GRC, Brandt, and West Grace North
- VCU offers **merchandise with poly-cotton blends**, purchasing and selling more poly-cotton blends over pure synthetic fiber materials helps reduces microfibers in wastewaters

Front-load type:

Top-load type:

Cesa et. al., 2017)

LANDFILLS/ TEXTILE WASTE

- An **average American** discards roughly **80 pounds of clothing** and textiles each year, taking up almost **5% of landfill capacity** (Bick et. al., 2018)
- In 2015, the United States sent over **$700 million worth of second-hand clothing** abroad (Bailey et. al., 2022)
    - Garments without buyers end up as **solid waste**, causing **blockages in rivers,** green spaces, and parks (Bick et. al., 2018)
    - Environmental and **health risks** in LMICs
    - Textile reuse extends the life cycle of items and decreases environmental impact

VCU Fashion and VCU Sustainability have worked together since 2014 to **recycle textiles** collected from the Pollak building

- Donating to the **VCU Free Store** and other nearby second hand stores helps reduce individual carbon footprint

OCCUPATIONAL HAZARD/ WORKING CONDITIONS OF GARMENT WORKERS

- **40 million workers** globally work in garment assembly
- **90% of the world's clothing** are produced in lower and middle-income countries (LMICs)

- Garment workers face health risk from:
  - **inadequate ventilation,** exposure to **synthetic airborne particles**
  - **Severe conditions: cancer, lung diseases**, **harm to hormonal balance**, **reproductive health and fetal development**, and **mortality**

- In 2013, the **Rana Plaza factory collapse** resulting in the **loss of 1134 lives** of Bangladeshi workers:
  - Brought attention to the **poor safety standards**, lack of building code enforcement
  - International organizations, governments, and labor groups initiated a range of agreements, and **safety initiatives to improve workplace conditions and safety for garment workers** in Bangladesh and comparable manufacturing centers worldwide.

Bick et. al., 2018

ALTERNATIVES TO FAST FASHION/ PURCHASING SYNTHETIC FIBERS:

- Shopping Second hand or Thrifting
- Borrowing/ renting clothes for events
- Purchasing natural, recycled, regenerated, or blended fibers
- Upcycling Existing Wardrobe & DIY
- Shop Sustainable or Support Local Brands & Independent Designers
- Clothing Swaps/ Style swaps
- Investing in a Capsule Wardrobe

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