

Cotton-a case study

Navigating through Nexus thinking



1. What are the company's priorities and what are the company's challenges?

The company prioritises high quality cotton yields and focuses on both environmental and social sustainability. Zambian cotton is a strategic priority for the company and has specific draw that prevents the company from simply altering its sourcing geographies.

Company priorities will change depending on the type of company and where it stands within the supply chain. Often, companies are very far removed from the growing stage (where many of the natural capital challenges lie), and by addressing the growing element or farm level landscape of the supply chain, there is potential for improvements in quality of cotton, social sustainability and environmental sustainability. One of the first steps includes building up a picture of the whole supply chain, where the natural capital issues are and what is practically occurring on the ground. Quality of produce will depend on practice (highly mechanised/automated/smallholders), season, the length/strength and maturity of fibre and the seed varieties.

Some of the challenges included lack of transparency in the supply chain, access to seeds (Bt, GMO etc), the lack of specific metrics on cotton quality, climate change impacts and rainfall variability, the risk of bad press and pest and disease outbreaks. Most of these challenges translate into the difficulty and uncertainties in terms of securing supply.

2. How does the system map out on the nexus?

Perhaps one of the reasons cotton traders are very reluctant to map cotton systems out is the extent to which it is convoluted and far reaching. Cotton is a thirsty crop and depends on water resources, while also impacting upon them. Cotton can also provide/create biodiversity if it is managed correctly but a drive for increased yield may in fact negatively impact biodiversity. For instance, the use of pesticides may impact yield positively but will have negative implications for water resources and local communities.

Maintaining company relationships with local smallholders may be difficult but it is of utmost importance. If a company pays for the extension services, health, schools of farmers to support local livelihoods it is also likely to reduce farmer pay. This leaves room for another company to offer a higher price for cotton seed; thus supply is not guaranteed even if companies invest in livelihoods of their smallholder farmers as the lure of a higher price is too great.

Climate change impacts also disrupt continuity of supply by altering rainfall patterns, thereby stressing local food production as well as cotton production and suggesting potential competition over water sources. This may create the need for irrigation and desalinisation, both of which are energy intensive.

The production of fertilizers and pesticides is also energy intensive and can have impacts on water through eutrophication, and therefore impact local fishing industries, and on the environment through emissions.

There may also be competition over land resources as well as over high quality soil, which in turn affects water retention. Many of these issues point to the need for adequate infrastructure investments that address interlinked challenges.

In summary

- **Food:** Cotton can become in competition with food for land and for water. Cotton can also contribute to food crop rotations. Local fishing industries may be negatively impacted by cotton production polluting water sources thereby threatening local food security and local incomes.
- **Energy:** Producing fertilisers is very energy intensive and if climate change impacts destabilise rainfall patterns, cotton production may have to rely on irrigation or desalinisation, which are also energy intensive.
- **Water:** Cotton is a very thirsty crop but can also pollute waterways through pesticide runoff.
- **Environment:** If managed properly, cotton production can actually benefit biodiversity but it can also degrade soil and land resources significantly, thereby affecting other systems including food production. Emissions from cotton production may contribute to climate change which in turn may impact water sources necessary for cotton production.

3. What are the recommendations for action?

Recommendations for action included the need to consider the elements within the nexus map and avoiding focussing on simply one element (such as only pests). Recommended action must be in line with priorities and challenges.

Some ideas for further action include:

1. Partnerships to foster the right models and data and share knowledge. Transparency within supply chains is key.
2. Extension services to empower farmers with education, coupled with microfinance mechanisms as well as farmer cooperatives could bring about both socially and environmentally sustainable systems. Encouraging responsible farming and agricultural practices could promote efficient use of and application of pesticides to mitigate potential damages whilst improving productivity.
3. The establishment of long term contracts with local farmers could yield positive social consequences, secure supply chains and galvanize long-term relationships.

Regardless of the action necessary for the company to address its challenges, there is a need to map out supply chains and consider who is adding value and where so that these entry points can be influenced. Other considerations may include shifting to FairTrade cotton, analysing environmental and social thresholds and limits, sourcing from elsewhere (country, region, landscape etc). Where companies source cotton from is actually of immediate concern and there is a need to identify impact within geographies and the risks these encompass. This puts into question whether where cotton is being sourced from is inadequate now or in the future. There are of course ethical concerns especially around child labour and job security and developments could look at improving environmental and farming literacy.

Dairy-a case study

Navigating through Nexus thinking



1. What are the company's priorities and what are the company's challenges?

The industry is facing low milk prices and rising costs so the company is currently prioritising lowering input costs such as animal feed and fertiliser to ensure its economic viability. At the same time it also has to manage its environmental impacts including water pollution and emissions to meet increasing regulatory standards.

Therefore the industry is evolving through technical innovation to increase productivity with lower inputs costs whilst minimising its environment impacts and dependencies. By balancing these challenges it can ensure its security of supply and continue its role in land stewardship.

2. How does the system map out on the nexus?

The dairy industry has impacts and dependencies related to all aspects of the nexus. The main connections include:

- Food: It creates milk and other food ingredients whilst also requiring food for animal nutrition and welfare.
- Energy: This is requiring for milking, processing, cooling and transporting dairy products whilst the industry can generate energy through anaerobic digestion.
- Water: Needed for animal nutrition and welfare but too much water will impact the production of silage and other animal feeds. Excess water and nutrients can also be extracted from milk processing and recycled to the farm.
- Environment: Dairy production creates methane which damages the environment through climate change but dairy farmers also add to the social and cultural heritage of the rural landscape.

The complex interactions related to the nexus on which dairy production either depends or impacts were discussed with the group. This includes impacts between the different elements: eg fertiliser production used to increase animal feed yields has dependencies on the environment, water and energy.

3. What are the recommendations for action?

It's essential the different impacts and dependencies on the nexus elements are considered holistically. There are areas which could benefit from further research to enhance dairy productivity whilst protecting its long-term sustainability. These include:

1. Using a Sankey model to assess the industry's priorities and key levers related to the nexus elements
2. Collaborating at an industry level then bringing up recommendations to policy

Timber-a case study

Navigating through Nexus thinking



1. What are the company's priorities and what are the company's challenges?

The company's priorities included the need to maintain long term sustainable profits as well as secure licenses to operate. Ensuring that supply chains are viable, and thereby addressing operational risk, and that there is the appropriate stakeholder alignment are also fundamental to the company. Being aware of the wider industry's actions and discussions will mitigate against reputational risks and perhaps help manage cost intensification.

Challenges to the company include regional water shortages, pest and pathogens, climate change impacts, land encroachment, completion over land and land ownership issues, conservation concerns and reducing productive capacity. Regulatory frameworks are constantly evolving and the company has go beyond standards and explore practices that will actually address declining. Taking into account local communities and stakeholders is essential to maintain not only value chains but also licenses to operate and reputation.

2. How does the system map out on the nexus?

The group considered nexus thinking as an important way of c considering the system and in particular found it helped consider dependencies at a landscape level and raised questions of different land use. The issues that using the nexus approach highlighted were:

- Water: Although predominantly rain fed, forests impact and are dependent on healthy ground water and aquifers, provides flood control/water purification
- Food: Competing demands for land between agriculture and forestry, providing habitats for wildlife and forest foods. Forest encroachment from rising food demands
- Energy: Competing demands for biomass, providing a valuable carbon sink e.g. offsets for others
- Environment: Dependency on appropriate land, adequate and heathy soil and water resources necessary for healthy timber of timber plantations. Need a stable climate and monocultures vulnerable to outbreaks of disease

The nexus approach forces companies to look at their dependencies as much as their impacts and requires long term and system thinking. In this case it requires a cultural shift from those within the company being 'tree planter' to a new role of 'landscape mangers'. It should encourage synergies with other stakeholder strategies, not trade-offs alone e.g. in the completion for land between forests and food, the latter will always win. The solutions lie in using nexus thinking in a flexible non-confrontational way to identify, with a group of stakeholders, the value streams through a landscape.

3. What are the recommendations for action?

Any recommendations for action need to deal with not only impacts but also with the value chain's dependencies. A chief requisite is to develop a timeframe of operations, identify the dependencies and understand synergies and trade-offs to maximise landscape efficiency and validate licences to operate.

Some ideas for further action include:

1. Alternatives to offsetting including transitioning to net-positive land stewardship that addresses production dependencies and ensuring that messaging takes into account company/ industry culture and government context.
2. Using a nexus lens to optimise different landscape interventions
3. Identify the nature of investment (long/short term returns, public/private) best suited to fund particular interventions.