Aquaculture plays a prominent role for the satisfaction of current and future human dietary needs. According to FAO, by 2025 the share of aquaculture on the total world fishery production will grow by 8% points, from 44% to 52%, reaching the level of about 100 million tons. Achieving this production level depends on a series of factors such as availability and accessibility of good production locations, sufficient investments in infrastructures, capital availability, and availability of fish feed in the required quality and quantities. With regard to fish feed, a substitution effect between traditional fish meal/oil and vegetable meal/oil can be observed. When looking at specific terrestrial plant ingredients such as e.g. soy or maize, it has to be noted that these feed ingredients partly originate from areas rich in biodiversity and carbon stock, often connected to deforestation or grassland conversion. This article focuses on the impacts of terrestrial plant ingredients production for aquaculture feed and provides insights into solutions that certification schemes like ISCC (International Sustainability and Carbon Certification) are able to offer for the implementation of deforestation-free and sustainable feed supply chains.
Use of vegetable fats and proteins in aquafeed

According to the FAO (2011), the most prominent aquafeed ingredients used for the three most relevant finfish species groups are vegetable ingredients of terrestrial origin, making up around 60% to 80% in weight (figure 1). With 30% share, rapeseed meal is the most relevant meal, closely followed by soybean meal, wheat and maize.

There has been a substitution effect between traditional fishmeal and vegetable meal mainly driven by availability and market prices. Figure 2 shows that in 2016 international market prices for fish meal were four times higher than the ones of soybean meal, while the price for fish oil was more than double than the one for alternative vegetable oils, such as rapeseed and soybean oils.

Taking into consideration the growth of the aquaculture sector, the lower price of vegetable-meals and the substitution trend described above, it is a question whether the needed future and rapid expansion of terrestrial feed production for aquaculture will be able to cope with the necessary social and environmental requirements set by retailers and demanded by consumers.

Challenges of sourcing sustainable feed

Due to the fact that feedstock used for aquafeed often originate from highly biodiverse and carbon rich areas special attention has to be put on the risks associated with its production, such as deforestation or the conversion of highly biodiverse grassland. Effects of deforestation linked to soybean production have been already highlighted by many NGOs (figure 3).

Fig. 1. World finfish aquaculture production and diet of the three most relevant species group (fish production referred to year 2014).

Fig. 2: Prices of fish-, soybean-, rapeseed- oil and meal (2011 – 2016).

Footnotes:

2 Catfish not included
3 Fishmeal, 64/65%, Bremen fca; Soya meal, 49%, Arg, cif Rott; Rape meal, 34%, fob ex-mill Hmb; Fish oil, any orig, cif N.W.Eur; Soybean oil, Brazil, fob; Rape oil, Dutch, fob ex-mill
4 Monthly notation until April 2016
Given this background, it is a challenge for the feed industry to keep promise of the no deforestation commitments and their responsible sourcing policies. Leading players of the feed industry have set ambitious objectives (figure 4), however, there still needs to be a lot done, looking at the current land use change level.

Fig. 3: Excerpts of reports and articles from WWF and Mongabay websites highlighting soybean cultivation related deforestation risks.
Public No-Deforestation Commitment where ADM commits to build traceable and transparent agricultural supply chains that protect forests worldwide.

In 2014, Cargill endorsed The New York Declaration on Forests, announcing at the United Nations Climate Summit our goal to eliminate deforestation across our agricultural supply chains, halving it by 2020 and ending it completely by 2030.

We are committed to eliminating deforestation from our agricultural supply chains worldwide, employing tested methodologies that incorporate carbon and biodiversity protections.

BioMar has a programme seeking to eliminate use of raw materials causing deforestation of tropical rainforests within 2020.

By 2020 we will contribute to the development of an industry based solution to reduce deforestation associated with the primary production of crops.

Our responsible sourcing policy is clearly built on the pillar ‘responsible raw materials’.

Fig. 4. Sourcing policy position of leading aquafeed producers.
ISCC Solutions for sustainable and deforestation-free supply chains for feed

In order to address the above-mentioned challenges and to keep promise of the no deforestation commitments and responsible sourcing policies, more and more companies are using ISCC to prove compliance and show their commitment towards sustainable production.

ISCC is a globally leading certification system, which provides solutions for sustainable and deforestation-free supply chains. It has been developed through an open multi-stakeholder process and is currently governed by an association with nearly 100 members. The ISCC system covers all kinds of agricultural, forestry and alternative raw materials and can be applied in various markets, including the feed, food and biochemical market as well as in the bioenergy sector. Since its start of operation in 2010 over 17,000 certificates in more than 100 countries have been issued.

ISCC provides full traceability along supply chains through site-specific certificates issued by independent certification bodies, who verify compliance with high ecological and social sustainability requirements, including land and labour criteria such as the protection of biodiversity, the preservation of carbon sinks, good agricultural practices and the respect of human and social rights. Compensation for new plantings is not allowed. Another core pillar of ISCC certification is the carbon footprint verification as well as the non-GMO production for feed, which both can be applied on a voluntary basis. All ISCC certificates are published on the ISCC website and enable each player to source sustainable products from any certificate holder.

In order to verify that no illegitimate land use change has taken place, ISCC uses GRAS (Global Risk Assessment Services), a web-based tool based on remote sensing technology which provides comprehensive sustainability-related geo-referenced information on biodiversity, land use change, carbon stock and social indices. Occurrence of land use change can be verified by using a simple to interpret greenness index called the Enhanced Vegetation Index (EVI). Using EVI time series from 2000 until today, GRAS users can differentiate among the types of green cover, see the history of the land use, and most importantly detect the exact point in time of land use change (see example in figure 5). For producers, the use of GRAS is a secure and credible way to prepare for sustainability certification and to verifiably implement no-deforestation commitments. Auditors can use it for risk analysis prior to certification.

Increasing demand for aquaculture feed causes a shift from the use of fish meal/oil to vegetable meal/oil as feed ingredient. Along with this shift comes the risk of sourcing raw material associated with deforestation or grassland conversion as well as other environmental and social problems.

Fig. 5. GRAS can identify the exact point in time when land use change has taken place. Example Brazil.
Another problem the aquaculture industry is facing is the loss of mangroves due to expansion of aquaculture production into mangrove areas. GRAS is in the position to clearly identify mangroves and show any land use change with a high accuracy, using high resolution satellite images. The GRAS tool is able to map existing aquaculture operations based on polygons provided by farm operators and it analyzes mangrove destruction in the past until today (see figure 6). Furthermore, it points out areas of high biodiversity in the vicinity of the farm operations and offers a continuous monitoring of the operations and the respective surrounding areas (e.g. annually).

Conclusions

Increasing demand for aquaculture feed causes a shift from the use of fish meal/oil to vegetable meal/oil as feed ingredient. Along with this shift comes the risk of sourcing raw material associated with deforestation or grassland conversion as well as other environmental and social problems. Due to this risk, feed producers are increasingly under observation of Non-Governmental Organisations (NGOs) and consumers and at the same time retailer request proof that supply chains are sustainable and deforestation-free.

Credible certification is essential in order to have a real impact on the previous mentioned challenges. The ISCC system applies high sustainability standards and strict rules of implementation and verification. Through the use of innovative tools and technologies ISCC ensures a credible, effective and cost efficient certification process. The combination of ISCC together with the GRAS tool allows its users to source sustainable and deforestation-free material. ISCC certification is therefore an important pillar in sustainability strategies of companies, which can be used for communication with customers.

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