

# From Brazilian farms to Norwegian tables

A report about soya in Norwegian salmon feed



Regnskogfondet  
RAINFOREST FOUNDATION NORWAY



Framtiden  
i våre hender



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## 1. Introduction

The soya bean industry in South America is expanding, to the detriment of rainforest and other vulnerable forest areas. This is causing large-scale environmental damage and health problems, as a result of the extensive use of toxic pesticides, amongst other things. In the years to come, the global demand for soya beans will continue to grow at a great rate, putting even more pressure on areas of land in South America. Norway is contributing to this pressure through its consumption of soya in animal and fish feed.

With this report, *Framtiden i våre hender* (FIVH) and Rainforest Foundation Norway (RFN) wish to contribute to a knowledge-based debate about Norwegian soya consumption and the challenges this creates. Most of the soya imported into Norway is used in the production of animal and fish feed. In this report, we examine soya consumption in the aquaculture industry.

Norwegian salmon is one of Norway's biggest export products. Salmon farming is an industry which is experiencing exponential growth, both globally and in Norway. Globally, aquaculture is the fastest-growing sector within feed production.<sup>1</sup> The global production of farmed salmon has more than doubled since 2000; roughly 2.07 million tons of salmon were produced globally in 2012. Over 60% of this was produced in Norway.<sup>2</sup> The Norwegian authorities would like the aquaculture industry to grow to five times its current size by 2050. This ambition brings with it a great responsibility for ensuring that Norwegian food production does not harm people or the environment.

Norwegian fish feed manufacturers are currently the largest importers of soya into Norway. Soya, in the form of soya protein concentrate (SPC)<sup>3</sup> from Brazil, is an important source of protein and a main ingredient in the feed consumed by Norwegian farmed salmon. As the world's largest producer of farmed salmon, Norway imported SPC extracted from 670,000 tons of soya beans in 2015, to use in fish feed. (See page 14.) Ninety-four per cent of this soya came from Brazil. It requires 0.55 kg of soya beans to provide enough SPC to produce 1 kg of Norwegian salmon. (See page 18.)

The four largest feed manufacturers, who account for over 99% of the soya imported, do not have any immediate plans to reduce their soya consumption.

Unless the composition of the feed is changed and the soya is replaced with other sources of protein, the planned fivefold growth in aquaculture will lead to a corresponding increase in soya imports for use in fish feed in Norway. This would demand the import of SPC from 3,350,000 tons of soya beans, requiring the occupation of over 11,000 km<sup>2</sup> land in soya producing countries. (See page 14.) This is greater than the sum of all of Norway's productive agricultural land in 2016. As this report shows, the use of soya as a raw material in aquaculture is linked to several dilemmas which have not yet been publicised in Norway. We hope that this report will promote awareness of these dilemmas, questioning both the ambitions for growth in the aquaculture industry and current production practices.

A fivefold increase in soya consumption in Norwegian fish feed is irresponsible, leading to increasing global demand for a raw material which contributes to environmental destruction and social conflicts. To avoid contributing to the growth of an industry which does not have control over its production and expansion, the Norwegian aquaculture industry should find sustainable alternative raw materials for fish feed, thereby reducing the consumption of soya.

The grave environmental and social problems created by the entire soya industry in South America are our initial concern. Therefore, this report commences with a description of three of the greatest challenges posed by the soya industry: deforestation, the use of pesticides that constitute health hazards, and conflicts over land between small farmers, local communities and indigenous peoples.

Furthermore, we have surveyed the total consumption of soya in the aquaculture industry, examining similarities and differences between different fish feed manufacturers. Finally, we have compared various salmon products commonly found in the supermarket.

This report has been written by FIVH and RFN in collaboration. RFN is an independent Norwegian organisation which works to save the world's rainforests and secure the rights of the people who live there. FIVH is an environmental organisation which has provided vital information about global supply chains for several decades and

1 Nofima, 2014. Resource utilisation of Norwegian salmon farming in 2012 and 2013. Available at: [https://nofima.no/wp-content/uploads/2014/11/Nofima\\_report\\_resource\\_utilisation\\_Oct\\_2014.pdf](https://nofima.no/wp-content/uploads/2014/11/Nofima_report_resource_utilisation_Oct_2014.pdf) 6.02.17

2 Ibid.

3 Soya protein concentrate (SPC) is one of several soya bean-based products developed for use in animal and fish feed.

The increasing global demand for soya contributes to large-scale environmental destruction and social conflicts. Photo: Kyrre Lien



is an important campaigner for more sustainable consumption in Norway.

### 1.2 Scope

This report examines the use of soya in the production of fish feed for the aquaculture industry in Norway. Soya beans and other soya products are imported into Norway for use in both feed concentrates for animals and directly for human consumption (such as soya milk, soya sausages and meat substitutes). While several of the problems highlighted in this report also apply to soya used in Norwegian animal feed, the focus here is on fish feed, for the following reasons: (1) at present, the fish feed industry uses the greatest amount of soya in terms of volume, and (2) the government's ambitions for future growth in the aquaculture industry could lead to a fivefold increase in soya imports for use in fish feed.

Our direct consumption of soya, in food products such as soya milk and soya sausages, does not constitute the same threat to the rainforest, environment and people. Far less soya is imported for human consumption than animal consumption, and soya for human consumption often comes from places other than South America, such as the United States and Canada. In addition, it takes more resources to produce meat or fish than it does to produce most soya-based vegetarian products for human consumption.

Several of the manufacturers who produce fish feed in Norway also produce feed in other countries, aimed at the international market. Although this report does not cover production for overseas markets, the challenges that are outlined apply equally to feed production outside of Norway and/or for foreign markets.

The content of this report is based on statistics provided by Statistics Norway (SSB), our own surveys of manufacturers of fish feed and salmon products, interviews with research scientists and desk studies.

## 2. Problems with the soya industry in South America

### 2.1 Soya and deforestation in South America

There has been an enormous increase in soya bean cultivation over the past few decades due to a growing global demand for soya for use in feed.<sup>4</sup> To a great extent, this increase in cultivation has

been to the detriment of rainforest and other ecosystems. At present, there is no control over the expansion of the soya industry in practice and, increasingly, valuable nature is being destroyed in favour of vast monoculture plantations in South America, at great cost to both the environment and people.

### *From deforestation boom to 'Soy Moratorium' in the Brazilian Amazon*

In the 1990s and early 2000s, deforestation of rainforest to make way for soya bean cultivation in Brazil skyrocketed.<sup>5</sup> As a result of strong pressure from civil society organisations, growers and buyers of soya introduced a voluntary ban on the purchase of soya grown in areas in the Brazilian Amazon that have been deforested after 2008. This agreement is known as the 'Soy Moratorium'.<sup>6</sup> Since the ban came into force, deforestation for soya cultivation has been dramatically reduced in the Brazilian rainforest. In the period before the Soy Moratorium was introduced, almost 30% of soya expansion in the Brazilian Amazon took place in newly-deforested rainforest areas. After the Soy Moratorium, this fell to under 1% (2014).<sup>7</sup> In 2016, the Soy Moratorium was extended indefinitely.<sup>8</sup>

A reduction in deforestation for soya cultivation does not mean that soya is not being grown on a large scale in the Brazilian Amazon today. However, this is being carried out primarily in areas that were deforested before 2008 and, therefore, not covered by the terms of the Soy Moratorium.

### *The relocation of deforestation*

While the result of the Soy Moratorium is positive, it does not mean that the problem has disappeared – it has merely relocated to other areas. The Soy Moratorium applies only to the Brazilian part of the Amazon and, as a consequence of the high global demand for soya, soya cultivation is being moved to other areas and countries where there are no similar regulations in place. In Brazil and neighbouring countries Bolivia, Paraguay and Argentina, enormous tracts of rainforest and

4 <http://www.fao.org/faostat/en/#data/QD>

5 [http://rainforests.mongabay.com/amazon/deforestation\\_calculations.html](http://rainforests.mongabay.com/amazon/deforestation_calculations.html), 13.03.2017

6 [http://www.greenpeace.org/international/Global/international/code/2014/amazon/index\\_pt.html](http://www.greenpeace.org/international/Global/international/code/2014/amazon/index_pt.html), 13.03.2017

7 Gibbs, H.K., L. Rausch, J. Munger, I. Schelly, D.C. Morton, P. Noojipady, B. Soares-Filho, P. Barreto, L. Micol, and N.F. Walker, 2015. Brazil's Soy Moratorium. *Science* 347(6220): 6220. Available at: <https://nelson.wisc.edu/sage/docs/publications/Gibbsetal-Science2015.pdf>

8 <http://www.regnskog.no/no/nyhet/soyastans-forlenges-i-brasil>

savannah woodland are being destroyed to make way for soya and beef production. Almost 40,000 km<sup>2</sup> of forest were destroyed in South America annually between 2000 and 2010, most of it to accommodate soya bean crops and beef production.<sup>9</sup>

### *The Brazilian savannah is being eaten away*

In Brazil, large sections of the tropical savannah biome known as the Cerrado, located on the periphery of the Amazon, have been destroyed to make way for soya plantations and cattle farming. Researchers estimate that roughly half of the Cerrado's original 2 million km<sup>2</sup> have already been deforested and this is continuing.<sup>10</sup>

In the years 2007 to 2013, the same period in which the Soy Moratorium was introduced and there was a reduction in deforestation to make way for soya cultivation in the Brazilian Amazon, between 11 and 23% of the soya industry's annual expansion took place in recently-deforested sections of the savannah biome.<sup>11</sup> Almost 40% of the soya expansion on recently-deforested sections of savannah during this period occurred in a part of the Cerrado described as Brazil's new 'front line' for soya and deforestation: the border regions between the states of Maranhão, Tocantins, Piauí and Bahia ('Matopiba'<sup>12 13</sup>).<sup>14</sup> This clearly shows that the soya industry in Brazil still has a significant deforestation problem.

Over 200,000 km<sup>2</sup> of savannah woodland is estimated to be favourable for soya production. Roughly 110,000 km<sup>2</sup> of this is unprotected and can be deforested legally under the new Forest Code of 2012.<sup>15</sup> This indicates that the legislation is not sufficient to protect important forest regions in Brazil. Therefore, it is necessary to extend the Soy Moratorium to cover the savannah biome, or

introduce similar regulations to this region.

In addition to the savannah biome being an important ecosystem in its own right, deforestation of this region also has significant negative consequences for the Amazon. Deforestation of savannah woodland leads to the drying out of rivers which run into the Amazon and to a reduction in rainfall, both in the savannah and the Amazon. When the savannah woodland disappears, the rainforest dries out and is more vulnerable to fire and destruction.<sup>16</sup>

### *Soya follows the cattle*

Another challenge is that soya growers often buy up areas which are in current use as grazing land for cattle. As a consequence, they push cattle out of already-deforested areas and into the rainforest or savannah biome, where new areas are deforested to make way for beef production. Cattle farming is the main cause of deforestation in the Brazilian Amazon, and in this way, the soya industry is an indirect cause of the disappearance of rainforest.<sup>17</sup>

### *The soya industry is spreading all over South America*

Other regions in South America with high levels of deforestation, which are also under strong pressure from the soya industry, include the Bolivian Amazon, the Chiquitano Dry Forests in Bolivia, the Yungas Rainforest in Argentina, the Gran Chaco Forest which stretches from Paraguay to Argentina and the Atlantic Forest in Paraguay.

Between 2010 and 2015, an area of 2,900 km<sup>2</sup> was deforested annually on average in Bolivia.<sup>18</sup> Over three quarters of this occurred in the Santa Cruz department, which contains large tracts of rainforest.<sup>19</sup> Paraguay has one of the highest rates of deforestation in the world and is the fourth largest soya exporter in the world. Soya and meat

9 FAO, 2010. Global Forest Resources Assessments 2010 Main report. Available at: <http://www.fao.org/docrep/013/i1757e/i1757e.pdf>

10 Union of Concerned Scientists, 2016. Factsheet: The Importance of the Cerrado. Available at: <http://www.ucsusa.org/sites/default/files/attach/2016/11/cerrado-fact-sheet-ucs-october-2016.pdf>

11 Gibbs, H.K., L. Rausch, J. Munger, I. Schelly, D.C. Morton, P. Noojipady, B. Soares-Filho, P. Barreto, L. Micol, and N.F. Walker, 2015. Brazil's Soy Moratorium. *Science* 347(6220): 6220. Available at: <https://nelson.wisc.edu/sage/docs/publications/Gibbsetal-Science2015.pdf>

12 'Matopiba' is the name of an area which includes parts of the bordering states of Maranhão, Piauí, Tocantins and Bahia.

13 <http://www.inputbrasil.org/clipping/matopiba-esta-perto-dolimite-diz-estudo/>, 13.02.2016

14 Gibbs, H.K., L. Rausch, J. Munger, I. Schelly, D.C. Morton, P. Noojipady, B. Soares-Filho, P. Barreto, L. Micol, and N.F. Walker, 2015. Brazil's Soy Moratorium. *Science* 347(6220): 6220. Available at: <https://nelson.wisc.edu/sage/docs/publications/Gibbsetal-Science2015.pdf>

15 Ibid.

16 Pires, F.G and M.H. Costa, 2013. Deforestation causes different subregional effects on the Amazon bioclimatic equilibrium. In *Geophysical Letters*, Vol. 4. Available at: <http://onlinelibrary.wiley.com/doi/10.1002/grl.50570/pdf>

17 Barona, E., N. Ramankutty, G. Hyman and O.T. Coomes, 2010. The role of pasture and soybean in deforestation of the Brazilian Amazon. *Environmental Research Letters*, Volume 5, Number 2. Available at: <http://iopscience.iop.org/article/10.1088/1748-9326/5/2/024002/pdf>

18 FAO, 2016. Global Forest Resources Assessment 2015. How are the forests changing? Second edition. Available at: <http://www.fao.org/3/a-i4793e.pdf>

19 Forest Trends, 2014. Consumer Goods and Deforestation: An Analysis of the Extent and Nature of Illegality in Forest Conversion for Agriculture and Timber Plantations. *Forest Trends Report Series*. Available at: [http://www.forest-trends.org/documents/files/doc\\_4718.pdf](http://www.forest-trends.org/documents/files/doc_4718.pdf)

At present, Brazil has the highest pesticide use in the world. Research shows a link between the use of pesticides and both cancer and congenital malformations.  
Photo: Pulsar Images / Alamy Stock Photo



make up 80% of the country's total exports.<sup>20</sup> Most of the soya is grown in the eastern part of the country, where agriculture has almost completely eradicated the forest. Now attention has turned to the west, towards the Gran Chaco region. The Ministry of Agriculture in Paraguay expects to take 2,000 km<sup>2</sup> of land into use for the new cultivation of soya beans annually, to reach its goal of 40,000 km<sup>2</sup> of soya plantations in the region.<sup>21</sup>

#### Soya, forests and climate change

Rainforests and other forests store large quantities of carbon. Soya bean plantations do not. When rainforests are chopped down or burned to make way for plantations, large quantities of greenhouse gases are released. Deforestation represents 10 – 15% of total greenhouse gas emissions globally, the equivalent of all of the cars in the world.<sup>22</sup>

#### *Soya, biodiversity and species displacement*

Natural forests contain many different species. Different plants and animals are mutually dependent on each other for survival. Plantations, on the other hand, are so-called 'monocultures', in which one species completely dominates to the detriment of natural diversity in the area.

Replacing forests with plantations reduces biodiversity drastically, and is one of the main reasons that many species are threatened with extinction. Soya plantations displace plant and animal species, both in the rainforest and other regions. The savannah biome in Brazil, for example, contains enormous biodiversity and is one of the most endangered ecosystems in South America.<sup>23</sup> Many species are only found there. If the savannah biome disappears, these species will disappear for ever. Many of the savannah biome species are already on the IUCN (International Union for Conservation of Nature) Red List of Threatened Species, such as the jaguar, the giant anteater, the Cerrado fox, the maned wolf, the marsh deer and the Pampas deer.<sup>24</sup>

## 2.2 Pesticides jeopardise health

Brazil has the highest rate of pesticide use in the entire world and this is constantly increasing. However, Brazil is not the only large-scale producer of food in the world; China, India, the USA and Europe have a higher rate of production in most food categories.<sup>25</sup> The exception is meat production, where Brazil is one of the major producers of beef and poultry.<sup>26</sup> With a declared annual use of 360,995 tons of pesticides,<sup>27</sup> Brazil passed the USA in pesticide use in 2008 and has topped the list ever since. According to Brazil's National Health Surveillance Agency (Anvisa), the use of pesticides in Brazil increased by 190% between 2005 and 2015, compared to a global increase of 93%.<sup>28</sup>

Fifty-two per cent of the pesticides used in Brazil are used by soya bean growers,<sup>29</sup> despite the fact that soya represents far less than half of the total plant-based agriculture.<sup>30</sup> Consequently, the food that is produced using the greatest amount of pesticides in Brazil today is soya.

Since the cultivation of soya beans and other agricultural products is concentrated in individual states, the use of pesticides is also higher in these states than in the rest of the country. Usage is highest in the state of Mato Grosso,<sup>31</sup> where most of the soya used in Norwegian animal and fish feed comes from. According to the research paper 'Agribusiness and its impact on the health of workers and inhabitants in Mato Grosso State,' the average amount of pesticides used per inhabitant was 3.7 litres nationally and 34.1 litres in Mato Grosso.<sup>32</sup>

#### *Dangerous pesticides on the market*

The range of pesticides that are permitted in Brazil is far wider than in Norway. In Norway, 255 products are permitted, based on roughly 100 different active ingredients,<sup>33</sup> whilst in Brazil, more

20 [http://www.wwf.org/py/que\\_hacemos/proyectos/iniciativa\\_de\\_transformacion\\_de\\_mercados\\_mti/la\\_expansion\\_soja\\_en\\_paraguay/](http://www.wwf.org/py/que_hacemos/proyectos/iniciativa_de_transformacion_de_mercados_mti/la_expansion_soja_en_paraguay/) 07.02.2016

21 <http://www.elagro.com.py/agricultura/inician-en-el-chaco-ensayos-de-soja-resistente-al-calor/>, 07.02.2016

22 Rainforest Foundation Norway, 2014. State of the rainforest 2014. Available at: [http://d5i6isioez552.cloudfront.net/documents/Publicasjoner/Andre-rapporter/StateOfTheRainforest\\_lo.pdf?mtime=20150630110748](http://d5i6isioez552.cloudfront.net/documents/Publicasjoner/Andre-rapporter/StateOfTheRainforest_lo.pdf?mtime=20150630110748)

23 Da Silva, J.M.C, J.M. Bates, 2002. Biogeographic Patterns and Conservation in the South American Cerrado: A Tropical Savanna Hotspot. *BioScience* (2002) 52 (3): 225-234. Available at: <https://academic.oup.com/bioscience/article/52/3/225/312213/Biogeographic-Patterns-and-Conservation-in-the>

24 [www.iucnredlist.org/](http://www.iucnredlist.org/), 19.01.2016

25 <http://www.fao.org/faostat/en/#compare> 15.02.17

26 *Ibid.*

27 According to FAO, a total of 360,995 tons of pesticides were used in Brazil in 2013. See: <http://www.fao.org/faostat/en/#data/RP> 07.02.17

28 [http://brasil.elpais.com/brasil/2015/04/29/politica/1430321822\\_851653.html](http://brasil.elpais.com/brasil/2015/04/29/politica/1430321822_851653.html) 07.02.17

29 Source: Sindiveg, Representative organisation for 37 companies in the pesticide industry. Available at: <http://dados.contraosagrotoxicos.org/dataset/ea52db50-5e02-44f6-b2c3-6f08841a3666/resource/3a46edf2-8fb7-4ff8-b8ab-13efb14ef6c2/download/balanco-2015.pdf> 10.02.17

30 <http://www.fao.org/faostat/en/#data/QC> 16.02.17

31 *Ibid.*

32 Pignati, W & J.O Machado, 2011. O agronegocio e seus impactos na saude dos trabalhadores e da populacao do estado do Mato Grosso. I: Gomez, C. et al. Saude do trabalhador na sociedade brasileira contemporanea. Rio de Janeiro, Fiocruz.

33 <http://www.mattilsynet.no/plantevernmidler/godk.asp> 03.01.16

than 1,000 products and hundreds of different active ingredients are permitted.<sup>34</sup> Pesticides that are prohibited in Europe and restricted in the USA are permitted in Brazil,<sup>35</sup> and some of the pesticides that are permitted in Brazil are considered to be very dangerous by the World Health Organisation (WHO). Many of these are controversial and in 2008, Brazil's National Health Surveillance Agency (Anvisa) began to review and re-evaluate 14 of the most controversial pesticides in Brazil. Even though most of these are illegal in other places, the re-evaluation has taken nine years so far. The process has met with legal actions from manufacturers and opposition among some parliamentarians.

'If it's not a court case, it's a congressional hearing,' Ana Maria Vekic, Head of Toxicology in Anvisa, commented to Reuters.<sup>36</sup>

So far, Anvisa has concluded that six of the controversial pesticides will be banned,<sup>37</sup> but implementation of the regulations takes time and pesticides which are considered to be extremely dangerous, such as parathion methyl,<sup>38</sup> are still being sold on the Brazilian market.

### *Dispersion and pollution*

To avoid pollution and health hazards, the use of pesticides is usually regulated. One way to reduce undesirable dispersion is to introduce restrictions on the distance between permitted use of pesticides and waterways, adjacent dwellings and other buildings. Previously, the distance requirements in Mato Grosso were 300 metres to villages and public water sources, and 150 metres to open settlements and water sources for isolated dwellings.<sup>39</sup> In 2012, the mandatory distances were reduced to 90 metres.<sup>40</sup> Plantations that are sprayed with chemicals that are hazardous to health can, therefore, be situated less than 100 metres from dwellings, kindergartens and sources of drinking water.

Higher concentrations of organochlorines have

been found in the urine and blood of rural inhabitants than in urban inhabitants in Mato Grosso.<sup>41</sup> Organochlorines are active ingredients that are used in several pesticides and can have a negative effect on the nervous systems of both humans and animals. Organochlorines are best known in connection with the controversial pesticide DDT (Dichlorodiphenyltrichloroethane), but they are also found in other forms in other pesticides.

### *Chemical residues in Brazilian food*

For the inhabitants of Brazil, the widespread use of pesticides in agriculture means that there are large quantities of pesticide residues in foodstuffs. In 2014, Brazil's National Health Surveillance Agency (Anvisa) tested 1,665 different food products and found that 29% of these contained chemical residues that exceeded maximum residue levels and also pesticides that are banned in the country.<sup>42</sup>

### *Poisoning and disease*

Workers on the plantations and local inhabitants living around the plantations are also exposed to toxins and health problems. Sinitox, the National Poisoning Information System of the Brazilian Ministry of Health, registers instances of poisoning annually. In 2012, 4,656 Brazilians were registered for pesticide poisoning.<sup>43</sup> A quarter of these were registered as work-related.<sup>44</sup> In the same year, 128 deaths resulting from poisoning linked to pesticides were registered.<sup>45</sup> However, the number of unrecorded cases is high. The National Cancer Institute, INCA, estimates that there are 50 unregistered cases of poisoning for every instance that is registered, meaning that the number of poisonings is probably 50 times higher than those registered by Sinitox.<sup>46</sup> According to the Pan American Health Organisation, pesticides are the second largest cause of poisoning in Brazil.<sup>47</sup>

34 On the website of the Brazilian Ministry of Agriculture, you can find an overview of registered pesticides. If you add up all of the pesticides that have been registered over the past ten years, the total sum is 1,268.

35 For example, see page 65 in this report: [http://www.abrasco.org.br/dossieagrotoxicos/wp-content/uploads/2013/10/DossieAbrasco2015\\_web.pdf](http://www.abrasco.org.br/dossieagrotoxicos/wp-content/uploads/2013/10/DossieAbrasco2015_web.pdf) 10.02.17

36 <http://www.reuters.com/investigates/special-report/brazil-pesticides/> 23.02.17

37 Anvisa: <http://portal.anvisa.gov.br/registros-e-autorizacoes/agrotoxicos/produtos/reavaliacao-de-agrotoxicos> 10.02.17

38 [http://www.who.int/ipcs/publications/pesticides\\_hazard\\_2009.pdf](http://www.who.int/ipcs/publications/pesticides_hazard_2009.pdf) 03.01.16

39 Mato Grosso Decree 2283, 9 December 2009: <https://www.legisweb.com.br/legislacao/?id=133502> 27.01.17

40 Mato Grosso Decree 1362, 13 September 2012, state decree 1651 of 11 March 2013: <http://www.legisweb.com.br/legislacao/?legislacao=252231> 27.01.17

41 M.Belo et al, 2012. Uso de agrotóxicos na produção de soja do estado mato grosso: um estudo preliminar de riscos ocupacionais e ambientais. Revista Brasileira de Saúde Ocupacional. And Soares, M. et al. 2012. Uso de agrotóxicos na produção de soja do Estado do Mato Grosso: um estudo preliminar de riscos ocupacionais e ambientais. Page 83. Available at: <http://www.scielo.br/pdf/rbso/v37n125/a11v37n125.pdf> 10.02.17

42 <http://www.reuters.com/investigates/special-report/brazil-pesticides/> 06.02.17

43 <http://sinitox.icict.fiocruz.br/sites/sinitox.icict.fiocruz.br/files//agrotoxico%20ouso%20agricola%20tabela%201.pdf> 03.01.16

44 Ibid.

45 <http://sinitox.icict.fiocruz.br/sites/sinitox.icict.fiocruz.br/files//agrotoxico%20ouso%20agricola%20tabela%206.pdf> 03.01.16

46 [http://www2.inca.gov.br/wps/wcm/connect/comunicacao/informacao/site/home/namidia/brasil\\_lidera\\_ranking\\_consumo\\_agrotoxicos](http://www2.inca.gov.br/wps/wcm/connect/comunicacao/informacao/site/home/namidia/brasil_lidera_ranking_consumo_agrotoxicos) 10.02.17

47 [http://www.paho.org/salud-en-las-americas-2012./index.php?option=com\\_docman&task=doc\\_view&gid=118&Itemid=07.02.17](http://www.paho.org/salud-en-las-americas-2012./index.php?option=com_docman&task=doc_view&gid=118&Itemid=07.02.17)

### *Pesticides and congenital malformations*

A number of studies carried out on different continents have concluded that the exposure of mothers to pesticides is one of the causes of congenital malformations. In 2011, a study was carried out in Mato Grosso to examine the connection between congenital malformations and parents' exposure to pesticides.<sup>48</sup> One hundred and thirty-seven mothers whose babies were born with congenital malformations were interviewed, to chart their exposure to pesticides during the three months before and the three months after conception, and the babies' fathers' exposure to pesticides in the twelve months prior to conception. The data on congenital malformations was surveyed with the help of hospital files.

The study showed that the exposure of mothers and fathers to pesticides is connected to congenital malformations. It also showed that the probability of congenital malformations was higher among couples where the mother was poorly educated and the father was in contact with pesticides. One possible explanation for this connection could be that a lack of education on the mother's part leads to greater exposure to pesticides in the home, as a consequence of washing the baby's father's work clothes, for example.

### *Cancer*

Several of the chemicals that are permitted in Brazil are linked to the threat of cancer, including glyphosate, which is one of the most commonly-used herbicides on soya plantations. It is the topic of great debate in both Brazil and its neighbour, Argentina, and is one of the chemicals that Anvisa is re-evaluating.

Registered cases of cancer have increased parallel with the development of export-oriented agriculture in Mato Grosso since the 1970s. At the Federal University of Mato Grosso, a large team of scientists have been studying the connection between cancer and pesticides. So far, the research team has found indications that a connection exists between large-scale use of pesticides and an increase in cancers of the stomach, pancreas and oesophagus. As part of the main research project, cases of cancer have been compared in municipalities with and without agriculture. In the 13 municipalities that produce agricultural products for the

global market, 1,442 cases of cancer have been registered, as opposed to 53 cases in municipalities without agricultural production.<sup>49</sup>

### *Deterioration in reporting, research and information*

The regulation of pesticide use is, to a large extent, dependent upon accurate collection of information, openness with regard to the use of chemicals and support for research into the effects of pesticide use. Since the current government came into power, civil society organisations and academics have sent notes of concern about politically-motivated administrative changes which weaken monitoring, information and research. The Ministry of Agriculture wants to simplify the registration process for pesticides by excluding the more independent bodies, Anvisa and Ibama, from the process.<sup>50</sup> The Minister of Agriculture, Blairo Maggi, who also owns Amaggi, one of the largest soya producers in the country, has proposed a number of bills to weaken the regulations for research, testing, production, consumer information on packaging, marketing, import and export, registration, and control of the use of pesticides.<sup>51</sup>

### **2.3 The soya industry threatens indigenous peoples and forest-based communities**

The current areas of interest for soya expansion in South America are often unprotected or have low levels of government control. They are also areas in which the level of conflict over land and the murders of indigenous leaders and environmental activists are among the highest in the world.<sup>52</sup> Frequently, deforestation is carried out to the detriment of forest-based communities and indigenous peoples who rely on the forest for their survival.

### *Brutal growth in agriculture*

The growth in agriculture in the Amazon and Central-West Brazil since the 1960s has been accompanied by a long history of land theft, destruction and violence. Indigenous peoples and small farmers have been driven off their own land, and the rainforest and savannah biome have been demolished to make way for roads and private farms.

48 Ueker, M. E. et al, 2016. Parental exposure to pesticides and occurrence of congenital malformations: hospital based case-control study. Available at: <https://bmcpediatr.biomedcentral.com/articles/10.1186/s12887-016-0667-x> 07.02.17

49 <http://outraspalavras.net/deolhonosruralistas/2016/09/11/territorio-da-soja-no-mt-tem-mais-casos-de-cancer-de-estomago-diz-estudo/> 27.01.17

50 <http://www.redebrasilatual.com.br/saude/2017/02/temer-antecipa-2018pacote-do-veneno2019-e-proibe-anvisa-de-dar-informacoes-sobre-agrotoxicos> 10.02.17

51 Ibid.

52 Global Witness, 2016. On Dangerous Grounds. Available at: <https://www.globalwitness.org/en/reports/dangerous-ground/>

Export-oriented agriculture in Brazil has led to large-scale conflicts between small farmers, who produce for the local market and large plantation owners, who produce for the global market. Many small farmers have been evicted or sold their land under duress, after pressure from large landowners. The distribution of land in Brazil is one of the most inequitable in the world. Less than 2% of the population own half of the arable land.<sup>53</sup> The unequal distribution of land and rural poverty form the basis of ongoing land reform in Brazil, which is intended to give poor families the chance to obtain land that they can cultivate. Land reform has made it possible for 370,000 families to acquire land for cultivation.<sup>54</sup> However, there are still at least 200,000 families who want land to grow food on for their own consumption and to sell at the local market.<sup>55</sup>

In 2015, the Catholic Church's Pastoral Land Commission (CPT) registered 771 conflicts in rural regions in Brazil.<sup>56</sup> These included 81,000 families who had been evicted and/or threatened by armed intruders. A number of examples indicate the involvement of soya companies in several of these incidents.<sup>57</sup>

### *Indigenous people, land defenders and environmental activists are being threatened*

In their report 'On dangerous ground,' Global Witness describes how increasing pressure on natural resources and the expansion of industry and plantations has led to a strong increase in the number of threats, violence and killings of land defenders and environmental activists all over the world.<sup>58</sup>

In 2014 and 2015, Brazil topped statistics for murders of land defenders and environmental activists.<sup>59</sup> The majority of these murders took place in states where there is an increase in levels of conflict between forest-based communities, cattle ranchers and plantation owners. Factory farmers, loggers and landowners hire armed men

to silence local opposition to their projects.<sup>60</sup> The UN's Special Rapporteur on the rights of indigenous peoples, Victoria Tauli-Corpuz, confirmed this impression in her recent report of her trip to Brazil: Indigenous peoples all over Brazil are experiencing an increase in threats, abuse and murder.<sup>61</sup>

### *Not just in Brazil*

The establishment of soya plantations is also the source of large-scale conflicts with local inhabitants and indigenous peoples in other countries that produce soya, such as Bolivia and Paraguay.

Paraguay has the highest concentration of land in the region: the owners of soya plantations and cattle farms own 90% of all arable land.<sup>62</sup> Large numbers of indigenous peoples in the east of Paraguay have either been evicted or forced to enter into illegal rental agreements with soya growers.<sup>63</sup> The indigenous peoples in the Gran Chaco region in the west of Paraguay risk losing their land rights and the basis for their existence now that the limits for deforestation are being pushed further north. This is of special concern for the Ayoreo Indians – the last uncontacted indigenous group outside of the Amazon.<sup>64</sup>

Ayoreo Indians also live in Bolivia, and are threatened there as well by the expansion of soya cultivation. One example is the village of Puesto Paz, a few hour's drive east of Santa Cruz. Until recently, they supported themselves by hunting and gathering. Now their territory is blocked off by soya plantations and they can no longer continue their traditional way of life.<sup>65</sup> Bolivia's population has the largest percentage of indigenous peoples in the region: 40.6% according to the 2012 Census.<sup>66</sup>

53 CEBRAP, 2012. The real Brazil, the inequality behind the statistics. Available at: <http://www.christianaid.org.uk/images/real-brazil-full-report.pdf> 17.02.17

54 <http://www.mstbrazil.org/content/what-mst> 17.02.17

55 <http://www.ipsnews.net/2015/02/rousseffs-brazil-no-country-for-the-landless/> 17.02.17

56 CPT, 2016. Conflitos no Campo. s. 109. Available at: <http://www.cptnacional.org.br/index.php/component/jdownloads/send/41-conflitos-no-campo-brasil-publicacao/14019-conflitos-no-campo-brasil-2015> 23.02.17

57 Ibid.

58 Global Witness, 2016. On Dangerous Grounds. Available at: <https://www.globalwitness.org/en/reports/dangerous-ground/>

59 Ibid.

60 Ibid.

61 V. Tauli-Corpuz, FN, 2016. Report of the Special Rapporteur on the rights of indigenous peoples on her mission to Brazil. Available at: <http://unsr.vtaulicorpuz.org/site/index.php/en/documents/country-reports/154-report-brazil-2016>

62 Base, 2015. Con la soja al cuello: Informe sobre Agronegocios 2013 - 2015. Available at: [http://www.sudamericarural.org/images/en\\_papel/archivos/ConLaSojaAlCuello.pdf](http://www.sudamericarural.org/images/en_papel/archivos/ConLaSojaAlCuello.pdf)

63 Oxfam, 2016. Desterrados: Tierra, poder y desigualdad en América Latina. Available at: [https://www.oxfam.org/sites/www.oxfam.org/files/file\\_attachments/desterrados-ejecutivo-es-29nov-web\\_o.pdf](https://www.oxfam.org/sites/www.oxfam.org/files/file_attachments/desterrados-ejecutivo-es-29nov-web_o.pdf)

64 Base, 2015. Con la soja al cuello: Informe sobre Agronegocios 2013 - 2015 Available at: [http://www.sudamericarural.org/images/en\\_papel/archivos/ConLaSojaAlCuello.pdf](http://www.sudamericarural.org/images/en_papel/archivos/ConLaSojaAlCuello.pdf)

65 Written records from field trips carried out under the auspices of RFN.

66 Instituto Nacional de Estadísticas. Nacional folketelling 2012. side 31. Available at: <http://www.ine.gob.bo:8081/censo2012/PDF/resultadosCPV2012.pdf> 23.02.17



Pesticides from soya plantations seep out into drinking water and are extremely hazardous for the people who live nearby. Groups of Indians in Xingu, in the Brazilian state of Mato Grosso, are highly concerned about the soya industry, which pollutes nature and is destroying ever larger parts of the rainforest they live in.  
Photo: Kyrre Lien

## 2.4 Ambitions for growth in the global soya industry increase the pressure on vulnerable regions

The total area occupied by soya cultivation globally now covers 1.2 million km<sup>2</sup><sup>67</sup> – an area that is almost as big as Norway, Sweden, Denmark and Finland put together.<sup>68</sup> Over half of this land, 885,000 km<sup>2</sup>, is in South America, of which 321,000 km<sup>2</sup> is in Brazil.<sup>69</sup>

It is expected that the global production of soya will almost double by 2050, from 270 million tons in 2012 to 514 million tons in 2050.<sup>70</sup> This is due to increased demand for soya for feed. Three quarters of the world's soya production is used in feed.<sup>71</sup>

According to the World Health Organisation (WHO), global meat production is estimated to rise by over 70%, from 218 million tons in 1999 to 376 million tons in 2030.<sup>72</sup> Soya is the most important source of protein in feed on a global basis.<sup>73</sup> Practically all farmed salmon and almost all commercially-farmed beef cattle, pigs and poultry are fed on soya.

Most of the soya produced in Brazil is exported to Europe and China, where it is processed for use in feed.<sup>74</sup> In proportion to the increase in meat consumption, the production of soya has increased tenfold, from 27 to 270 million tons (2012) over the past 50 years.<sup>75</sup> A large increase in the use of soya in fish feed will further contribute to this.

## 3. Growth ambitions of Norwegian aquaculture and the occupation of land in Brazil

### 3.1 Norwegian aquaculture's occupation of land in 2015

In 2015, 387,082 tons of SPC were imported into Norway.<sup>76</sup> Ninety-four per cent of this came from Brazil<sup>77</sup> and it was mainly used by Norwegian fish feed manufacturers.

SPC is produced by extracting oil and molasses from soya beans.<sup>78</sup> One of the three Brazilian suppliers of SPC to Norwegian fish feed manufacturers, Imcopa, says that they produce 0.57 kg of SPC per kg of soya beans.<sup>79</sup> Therefore, 1.75 kg of soya beans is required to produce 1 kg of SPC.

So, the Norwegian import of SPC in 2015, which totalled 387,082 tons, required 677,394 tons of soya beans.

In Brazil, 3 tons of soya beans are cultivated per hectare on average.<sup>80</sup> To grow the amount of soya beans needed to produce the SPC imported into Norway in 2015 required the occupation of an area totalling 2,258 km<sup>2</sup>, equivalent to approximately three times the size of the city of Berlin.<sup>81</sup>

As described in the introduction to this report, soya cultivation in Brazil leads to a range of environmental and social problems, such as deforestation, health hazards and conflicts with indigenous peoples and forest-based peoples.

67 ProTerra Foundation and Danube Soya Association, 2015. Non-GMO Soy Synopsis. Available at: [https://www.cert-id.eu/getattachment/Certification-Programmes/Non-GMO-Certification/Non-GMO-Soy-Certification/ProTerra-Cert-IDNonGMO\\_Soy\\_Synopsis\\_DEC\\_2015.pdf](https://www.cert-id.eu/getattachment/Certification-Programmes/Non-GMO-Certification/Non-GMO-Soy-Certification/ProTerra-Cert-IDNonGMO_Soy_Synopsis_DEC_2015.pdf)

68 Store Norske Leksikon. Norge: 386 209 km2, Sverige: 450 295 km2, Danmark: 43 094, Finland: 336 851 km2. [https://snl.no/Land\\_i\\_Europa](https://snl.no/Land_i_Europa), 20.02.2017

69 ProTerra Foundation and Danube Soya Association, 2015. Non-GMO Soy Synopsis. Available at: [https://www.cert-id.eu/getattachment/Certification-Programmes/Non-GMO-Certification/Non-GMO-Soy-Certification/ProTerra-Cert-IDNonGMO\\_Soy\\_Synopsis\\_DEC\\_2015.pdf](https://www.cert-id.eu/getattachment/Certification-Programmes/Non-GMO-Certification/Non-GMO-Soy-Certification/ProTerra-Cert-IDNonGMO_Soy_Synopsis_DEC_2015.pdf)

70 [http://wwf.panda.org/what\\_we\\_do/footprint/agriculture/soy/facts/](http://wwf.panda.org/what_we_do/footprint/agriculture/soy/facts/), 19.01.2016

71 The Royal Institute of International Affairs, 2016. Agricultural Commodity Supply Chains Trade, Consumption and Deforestation. Available at: <https://www.chathamhouse.org/sites/files/chathamhouse/publications/research/2016-01-28-agricultural-commodities-brack-glover-wellesley.pdf>

72 [http://www.who.int/nutrition/topics/3\\_foodconsumption/en/index4.html](http://www.who.int/nutrition/topics/3_foodconsumption/en/index4.html), 07.02.2016

73 The Nature Conservancy. An overview of the Brazil-China soybean trade and its strategic implications for conservation. Available at: <http://www.nature.org/ourinitiatives/regions/southamerica/brazil/explore/brazil-china-soybean-trade.pdf>

74 Ibid.

75 [http://awsassets.panda.org/downloads/wwf\\_soy\\_report\\_final\\_feb\\_4\\_2014\\_1.pdf](http://awsassets.panda.org/downloads/wwf_soy_report_final_feb_4_2014_1.pdf)

76 SSB Table: o8801: (Norwegian) Foreign trade in goods, listed according to product number (HS), country and product category. Product category: 21069093 Prepared foodstuffs, not mentioned or covered elsewhere, used as animal feed.

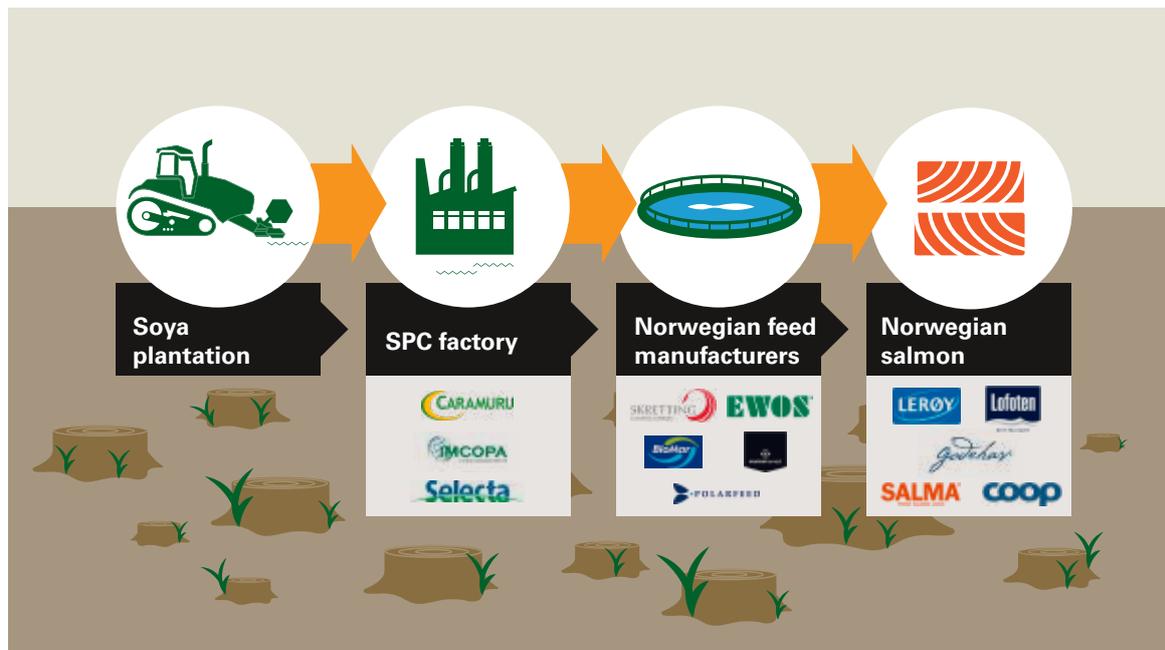
77 The five largest fish feed manufacturers declared a total consumption of 371,500 tons in 2015. The difference between the feed manufacturers' stated consumption and the total import figures for 2015 can be ascribed to: (i) there being other goods in addition to SPC which are included in SSB's category of 'prepared foodstuffs, not otherwise mentioned, for use in animal feed', (ii) the remainder being imported by other companies than the five largest feed manufacturers, or (iii) that fish feed manufacturers imported 387,082 tons of SPC, used 371,500 tons and the remainder is in storage. The difference between the total import figures and the stated consumption figures is, however, relatively small and has little effect on further analysis in the report. 16,000 tons amounts to 4% of 387,082 tons.

78 [http://www.selecta.com.br/download/pdf/Frequently\\_Ask\\_Question\\_EN.pdf](http://www.selecta.com.br/download/pdf/Frequently_Ask_Question_EN.pdf) 31.01.17

79 Reproduced in the Sintef report LCA of Norwegian Salmon production 2012. page 13. Available at: [https://www.sintef.no/en/publications/publication/?pubid=SINTEF+A26401\\_07.03.17](https://www.sintef.no/en/publications/publication/?pubid=SINTEF+A26401_07.03.17)

80 Average for 2014- 2015. <https://apps.fas.usda.gov/psdonline/circu-lars/production.pdf> 31.01.17

81 According to Kartverket, Vestfold is 2225 km2 [http://www.kartverket.no/globalassets/fakta-om-norge/arealer\\_fylker\\_2016.pdf](http://www.kartverket.no/globalassets/fakta-om-norge/arealer_fylker_2016.pdf)



The area occupied by the Norwegian aquaculture industry is the equivalent of 11,000 small farms in Brazil.<sup>82</sup>

### 3.2 Planned fivefold increase

Over the past few decades, the import of Brazilian SPC for use in fish feed has exploded, and now we can expect another dramatic increase. In 2004, on the other hand, there was virtually no import of SPC for use in fish feed.<sup>83</sup>

On a number of occasions, the Norwegian Government has expressed ambitions for a fivefold increase in aquaculture in Norway by 2050. The Minister of Fisheries, Per Sandberg, confirmed this to the Norwegian Broadcasting Corporation (NRK) after he took office in January 2016.<sup>84</sup> He reiterated this in an interview with the online newspaper *E24* in January 2017, saying ‘The Government has said that the ambition is to increase this several times over in the future,’ after which he added, ‘I think a fivefold increase might be an understatement.’<sup>85</sup>

In connection with the publication of the White Paper ‘Predictable and environmentally sustainable growth in Norwegian salmon and trout

farming’<sup>86</sup> in March 2015, the Minister of Fisheries at the time, Elisabeth Aspaker, said that ‘Research scientists indicate that it is possible to increase economic growth in marine-based industries sixfold by 2050. Aquaculture represents a large part of this growth.’<sup>87</sup>

The background for these ambitions can be found in the SINTEF (The Foundation for Scientific and Industrial Research) report from 2012, ‘Value creation based on productive oceans in 2050.’<sup>88</sup> Research scientists estimate in the report that a sixfold increase is possible within 2050. The same report estimates that Norwegian feed production will increase fivefold, from 1.2 million tons to 6 million tons in 2050.<sup>89</sup>

If Norwegian farmed salmon is going to be reared in the same way that it is today, the planned fivefold increase will require the import of SPC from approximately 3,350,000 tons of soya beans. This will require the occupation of an area roughly 11,000 km<sup>2</sup> in size, mainly in Brazil. In Norway, an area of 9,816 km<sup>2</sup> was used for agriculture in 2016.<sup>90</sup> The planned fivefold increase of Norwegian aquaculture will therefore require the occupation of an area in Brazil that exceeds all of the land used for food production in Norway today.

82 According to the Brazilian Government's Agricultural Economics Institute (IEA), a small farm in Brazil is up to 20 hectares in size. If you divide the total area occupied by Norwegian aquaculture, i.e. 225,798 hectares, by 20, this equals 11,290 small farms.

83 Framtiden i våre hender, 2014. (Norwegian) Godt brasiliansk. En kartlegging av soyaforbruket i norsk landbruk og oppdrettsnæring. Available at: <https://www.framtiden.no/rapporter/rapporter-2014/743-godt-brasiliansk-en-kartlegging-av-soyaforbruket-i-norsk-landbruk-og-oppdrettsnaering/file.html>

84 [https://www.nrk.no/video/PS\\*245703](https://www.nrk.no/video/PS*245703) (00'25 i klippet), 10.02.2016

85 <http://e24.no/boers-og-finans/sjoemat/fiskeriministeren-tror-femdobling-er-beskjedent/23888695>, 10.02.2016

86 Available at: <https://www.regjeringen.no/contentassets/6d27616f18af458aa930f4db9492f5e5/no/pdfs/stm20142015001600odddp-dfs.pdf>

87 <https://www.regjeringen.no/no/aktuelt/barekraftig-og-forutsigbar-vekst-for-laks/id2401801/>, 10.02.2016

88 Sintef, 2012. (Norwegian) Verdiskaping basert på produktive hav i 2050. Available at: <http://www.sintef.no/siste-nytt/verdiskaping-basert-pa-produktive-hav-i-2050/>

89 Ibid.

90 <https://www.landbruksdirektoratet.no/no/statistikk/utvikling/jordbruksareal%2027.01.17> og <https://www.landbruksdirektoratet.no/no/statistikk/utvikling/jordbruksareal> 27.01.17



Photo: Jim Wickens/Ecostorm

Feed manufacture	SPC consumption (tons)	Percentage of SPC in feed (%)	Produce non-soya based feed?	Intend to reduce soya consumption?
Skretting	144 000 tonn	26 %	No	No
Ewos	135 000 tonn	23 %	No	No
BioMar	56 000 tonn	14 %	No	No
Marine Harvest	35 000 tonn	12,5 %	Yes (2.5 % of product range)	No
Polarfeed	1 500 tonn	10 %	Yes	Yes

Overview of Norwegian feed manufacturers' consumption of soya in production of fish feed for use in Norwegian aquaculture in 2015. Source: Responses to RFN's feed survey in 2016.

It is a major problem for the rainforest, other forests and forest-based peoples that soya consumption is increasing. The global consumption of soya must decrease, to reduce the pressure on these areas and the health hazards and conflicts over land that soya cultivation brings with it.

#### 4. From Brazilian farms to the Norwegian table

Soya enters into the Norwegian salmon farming industry as part of a value chain, which starts with the production of the raw materials used for manufacturing feed, including soya. Feed is then sold to salmon farms, which then supply fish to food manufacturers, who process, distribute and sell fish and fish products.

Soya, in the form of SPC from Brazil, is currently a major part of the Norwegian aquaculture industry, and it is fish feed manufacturers who import most of the soya into Norway. SPC is a refined product from soya beans, and as the name says, is a concentrated form of protein. Soya is the most important source of protein in the feed consumed by Norwegian farmed salmon.

According to a report carried out by the Food Research Institute in Norway, Nofima, 1.27 million tons of salmon were slaughtered in Norway in 2012,<sup>91</sup> which is over 60% of global salmon production. To produce this salmon, feed containing 1.63 million tons of raw materials was used.<sup>92</sup> Twenty-three per cent of the fish feed produced in 2013 by the three largest fish feed manufacturers, Skretting, Ewos and BioMar, consisted of SPC.<sup>93</sup>

#### 4.1 Fish feed manufacturers and the amount of soya they use

In 2016, RFN asked fish feed manufacturers Skretting, Ewos, BioMar, Marine Harvest and Polarfeed about their use of soya in fish feed for the Norwegian market. According to the manufacturers themselves, these five together used 371,500 tons of SPC in 2015. This corresponds to 96% of the total import of SPC to Norway, which was 387,082 tons in 2015.<sup>94</sup> Of this, 362,218 tons were imported from Brazil and 23,180 tons from Russia.<sup>95</sup> This means that over 94% of the SPC imported directly into Norway in 2015 came from Brazil. All of the manufacturers who were questioned said that they used soya in virtually all of their feed products.<sup>96</sup>

Skretting and Ewos are leaders in both the Norwegian and global fish feed markets. They are the largest fish feed manufacturers on the Norwegian market and, together, they use 75% of the soya that is used in fish feed production in Norway.<sup>97</sup> On the companies' own websites we found information about the different fish feed manufacturers' markets and operations. BioMar is a major player in the European and Chilean fish feed markets, in addition to the Norwegian. Polarfeed sells solely to the Norwegian market. Marine Harvest is distinguished from the other four by being involved in several segments of the fish industry: fish feed production, fish farms, filleting, packing, sales and distribution. The other four companies are solely involved in feed production. In this report, only the feed manufacturers' production for salmon farming in Norway is presented.

#### *Skretting*

In 2015, Skretting produced 547,000 tons of feed in Norway. It has factories in Stavanger in Rogaland

91 Nofima, 2014. Resource utilisation of Norwegian salmon farming in 2012 and 2013. Available at: [https://nofima.no/wp-content/uploads/2014/11/Nofima\\_report\\_resource\\_utilisation\\_Oct\\_2014.pdf](https://nofima.no/wp-content/uploads/2014/11/Nofima_report_resource_utilisation_Oct_2014.pdf) 23.02.17

92 Ibid.

93 Ibid.

94 SSB Table: o88o1: (Norwegian) Foreign trade in goods, listed according to product number (HS), country and product category. Product category: 21069093 Prepared foodstuffs, not mentioned or covered elsewhere, used as animal feed.

95 Ibid.

96 Response to RFN's feed survey in 2016.

97 Ibid.

land county, Averøy in Møre and Romsdal county and Stokmarknes in Nordland county.<sup>98</sup>

Skretting is the manufacturer with the highest soya consumption; they used 144,000 tons of SPC in 2015.<sup>99</sup> They state that their feed contains 26% SPC on average, which is the highest soya content of all Norwegian feed manufacturers.<sup>100</sup>

Skretting is a subsidiary of the feed company Nutreco,<sup>101</sup> which is owned by the Dutch company SHV Holdings.<sup>102</sup>

### *Ewos*

Ewos produced 560,000 tons of feed in Norway in 2015.<sup>103</sup> The company has three factories in Norway: at Florø in Sogn and Fjordane county, Halså in Nordland county and Bergneset in Troms county.<sup>104</sup>

According to Ewos, they used 135,000 tons of SPC in Norway in 2015.<sup>105</sup> They state that their feed has an average SPC content of 23%.<sup>106</sup>

Ewos is owned by the American family-owned corporation, Cargill Inc., after the two companies merged in 2015.<sup>107</sup>

### *BioMar*

In 2015, BioMar produced roughly 400,000 tons of feed.<sup>108</sup> Its factories are located in Myre in Nordland county and Karmøy in Rogaland county.<sup>109</sup>

BioMar informed us that they used 56,000 tons of SPC in Norway in 2015.<sup>110</sup> They state that the average soya content in their feed was 14% in 2015.<sup>111</sup>

BioMar is owned by the Danish company Schouw & Co.<sup>112</sup>

### *Marine Harvest*

Marine Harvest produces 310,000 tons of feed annually in Norway and their factory is located in Valsneset in South Trøndelag county.<sup>113</sup>

The company states that they used a total of 35,000 tons of SPC in Norway in 2015, and that the average SPC content in their feed was 12.5%.<sup>114</sup> They also told us that they have a feed alternative which does not contain soya.<sup>115</sup>

Marine Harvest ASA is listed on the Oslo Stock Exchange (OSE)<sup>116</sup> and has a majority of Norwegian shareholders. The largest shareholder, with 16% of the shares, is the Cypriot company Geveran Trading,<sup>117</sup> owned by John Fredriksen.

### *Polarfeed*

Polarfeed is a smaller manufacturer, producing 35,000 tons of feed annually in Norway.<sup>118</sup> Their factory is in Øksfjord, Finnmark county.<sup>119</sup> Polarfeed sells solely to the Norwegian market.

The company states that they used 1,500 tons of SPC in 2015 and that the average soya content in their feed was 10%.<sup>120</sup> Polarfeed informed us that they also have a feed alternative that does not contain soya. They are the only manufacturers who claim to have plans to reduce their soya consumption.<sup>121</sup>

Polarfeed merged with Europharma in 2015 and is owned by the Norwegian company Nordly Holding, based in Leknes, Nordland county.<sup>122</sup>

### *Large percentage of soya in Norwegian fish feed*

All of the fish feed manufacturers use SPC in virtually all of their feed products. The examination in this report shows that there is very little fish feed produced for Norwegian aquaculture that does not contain soya.

We have not calculated the average SPC content of all the feed on the Norwegian market based on figures for 2015, but in 2013, the fish feed produced by the three largest feed manufacturers, Skretting, Ewos and BioMar, had an average SPC

98 <http://www.skretting.com/nb-NO/selskapsfakta/> 16.02.17

99 Response to RFN's feed survey in 2016.

100 Ibid.

101 <http://www.skretting.com/nb-NO/om-oss/historie/> 16.02.17

102 <http://www.nutreco.com/en/Corporate/> 16.02.17

103 Response to RFN's feed survey in 2016.

104 <http://www.ewos.com/wps/wcm/connect/ewos-content-norway/ewos-norway/production/factories/>, 03.03.2017

105 Response to RFN's feed survey in 2016.

106 Ibid.

107 <http://www.ewos.com/wps/wcm/connect/ewos-content-group/ewos-group/about-ewos/history/history> 16.02.17

108 <http://ilaks.no/vil-bygge-ut-biomar-fabrikk/> 07.03.17 and <http://kyst.no/nyheter/biomar-utvider-fabrikk-investerer-450-millioner/> 07.03.17

109 <http://www.biomar.com/no/norway/om-biomar/kontakt/#velg-land-15142> 07.03.17

110 Response to RFN's feed survey in 2016.

111 Ibid.

112 <http://www.biomar.com/no/BioMar-Norge/Om-BioMar/BioMar-Konsern/> 16.02.17

113 <http://ilaks.no/haver-inn-pa-eget-for/> 16.02.17

114 Response to RFN's fish feed survey in 2016.

115 Ibid.

116 <http://www.marineharvest.no/about/norges-storste/> 16.02.17

117 <http://ilaks.no/ingen-nye-storaksjonaerer-i-marine-harvest/> 07.03.17

118 <http://polarfeed.no/om/> 16.02.17

119 Ibid.

120 Response to RFN's fish feed survey in 2016.

121 Response to RFN's feed survey in 2016.

122 <http://polarfeed.no/om/> 16.02.17

content of 23%.<sup>123</sup>

Together, Skretting and Ewos use three quarters of the total SPC imported by Norwegian feed manufacturers. The feed they produce for aquaculture has an average SPC content of 26 and 23% respectively.<sup>124</sup>

Polarfeed is the only manufacturer that states that they have plans to reduce their use of soya.<sup>125</sup> However, their production represents only a small part of the total market, so this will not have any significant impact on the total use of soya in Norwegian fish feed.

Neither Skretting, Ewos, BioMar or Marine Harvest have plans to reduce their soya consumption.<sup>126</sup>

With the current feed composition and level of production in Norwegian aquaculture, 0.55 kg of soya beans is required to produce 1 kg of pure salmon (i.e. whole, not filleted or gutted).<sup>127</sup>

#### *Where does the soya in fish feed come from?*

We know that 94% of SPC imported into Norway comes from Brazil, but where in Brazil does it come from?

In Norway, manufacturers of food and feed are required to use soya that has not been genetically modified, so-called non-GMO soya. This entails strict control of the soya and places limitations on the places where it may be grown, which must be non-GMO areas.

Most of the soya which is imported can be traced back to where it was grown, at least technically.<sup>128</sup> However, feed manufacturers do not usually possess detailed information about which farm it comes from. Most of them do have information about which state the soya comes from.

Not all manufacturers declare which state the soya they buy comes from, but there is reason to

believe that most of it comes from Mato Grosso. This is the state with the highest soya production in Brazil, both conventional and non-GMO soya. From 1991 to 2016, soya cultivation in Mato Grosso increased by over 680%,<sup>129</sup> from 12,000 km<sup>2</sup> to 94,000 km<sup>2</sup>.<sup>130</sup> Mato Grosso is one of the states with the highest rate of deforestation of both rainforest and savannah woodland,<sup>131</sup> as well as the highest proportion of pesticide use in Brazil.

In addition to Mato Grosso, some of the manufacturers state that the soya they buy comes from the states of Bahia, Minas Gerais, Goiás, Mato Grosso do Sul and Paraná.<sup>132</sup> The part of Bahia where soya is cultivated is located in the region described as Brazil's new 'front line' for deforestation and soya, in the savannah biome known as 'Matopiba'.<sup>133</sup> Mato Grosso do Sul lies south of Mato Grosso and is one of the states in Brazil with high levels of conflict between industrial agriculture and indigenous peoples.<sup>135</sup>

#### **4.2 Brazilian SPC factories**

Norwegian fish manufacturers buy SPC from three different Brazilian suppliers: Caramuru, Imcopa and Sementes Selecta.

The family-owned Caramuru Group<sup>136</sup> processes and trades in soya, maize, sunflower and canola products. In 2013, the company opened a factory in Sorisso, Mato Grosso, to produce non-GMO SPC aimed at the Norwegian market.<sup>137</sup>

Imcopa<sup>138</sup> processes and sells different soya products, including soya oil, soya meal, SPC, soya lecithin and alcohol. Imcopa has factories in Araucaria and Cambe, Parana.

Sementes Selecta<sup>139</sup> processes and sells soya meal to the international feed market as well as products for the food, chemical and pharmaceutical industries. The factory is located in Araguari, Minas Gerais.

123 Nofima, 2014. Resource utilisation of Norwegian salmon farming in 2012 and 2013. Available at: [https://nofima.no/wp-content/uploads/2014/11/Nofima\\_report\\_resource\\_utilisation\\_Oct\\_2014.pdf](https://nofima.no/wp-content/uploads/2014/11/Nofima_report_resource_utilisation_Oct_2014.pdf) 16.02.17

124 Response to RFN's fish feed survey in 2016.

125 Response to RFN's feed survey in 2016.

126 Ibid.

127 SPC made up 22.7% of feed in 2013. (Calculation based on figure 10 and table 3 in the report Resource utilisation of Norwegian salmon farming in 2012 and 2013, issued by Nofima in 2014.) In 2013, 1.168 million tons of salmon were sold (SSB, table 07326). In the same year, 1.6 million tons of salmon feed were used (Nofima report, figure 10 and table 3). This means that for every kg. of whole (not filleted or gutted) salmon that was sold, 1.38 kg of feed was consumed, which contained 22.7%, or 0.31 kg, SPC. It takes 1.75 kg soya beans to produce 1 kg SPC (figure provided by the Brazilian SPC manufacturer Imcopa). This means that 0.55 kg soya beans were required for every kg salmon.

128 Traceable through the certification scheme ProTerra: <http://proterafoundation.org/index.php/certification>. See also Chap. 2.4 about certification.

129 <https://lucidarium.com.br/2012/09/22/vinte-anos-de-cultivo-da-soja-em-mato-grosso/>, 19.01.2017

130 <http://revistagloborural.globo.com/Estadao/noticia/2016/10/plantio-da-safra-de-soja-20162017-alcanca-42-da-area-prevista-em-mato-grosso.html>, 19.01.2017

131 <http://www.regnskog.no/no/nyhet/avskogingen-i-brasil-eksplo-derte-i-2016>, 19.01.2017

132 Response to RFN's feed survey in 2016.

133 <http://www.inputbrasil.org/clipping/matopiba-esta-perto-do-limite-diz-estudo/>, 19.01.2017

134 'Matopiba' is the name of an area which includes parts of the bordering states Maranhão, Tocantins, Piauí and Bahia.

135 <http://www.dagsavisen.no/helg-nye-inntrykk/rapportasjer/dyster-framtid-for-brasils-urfolk-1.921026>, 19.02.2017

136 <http://www.caramuru.com/institucional/?lang=en> 01.02.17

137 [http://www.caramuru.com/institucional/?page\\_id=101](http://www.caramuru.com/institucional/?page_id=101) 01.02.17

138 <http://www.imcopa.com.br/> 01.02.17

139 <http://www.selecta.com.br/en/> 01.02.17

### 4.3 Aquaculture companies

Fish feed is sold to fish farms where the fish are reared. In Norway, there are 151 companies that have commercial licences for farming salmon. However, there has been a comprehensive consolidation within the salmon industry as a result of takeovers, so in reality, there are 98 companies involved in aquaculture.<sup>140</sup> Of these, the ten largest companies produce 70% of the fish, measured in tons. The four largest, Marine Harvest, SalMar, Lerøy Seafood and Cermaq, are far ahead of the others, in terms of both production<sup>141</sup> and turnover.<sup>142</sup>

With the exception of Cermaq, all of these companies are listed on the Oslo Stock Exchange (OSE). Cermaq Norway AS was taken over by the Japanese industrial giant, Mitsubishi Corporation, in 2014. Even though the rest of the companies are listed on the stock exchange, their ownership is dominated by individual investors. In Marine Harvest, John Fredriksen owns 26% of the shares, through his Cypriot-registered company, Geveran Trading.<sup>143</sup> Lerøy Seafood is controlled by Austvoll Seafood, which owns 73% of the shares.<sup>144</sup> In SalMar, Kverva AS owns 53% of the shares.<sup>145</sup> In all three of these companies, Government Pension Fund Norway (*Folketrygdfondet*) is the next largest shareholder.

### 4.4 Soya content in the salmon on our dinner plates

The final stages in the salmon production chain are processing, packing, distribution and sale of salmon to commercial kitchens and shops all over the world.

FIVH and RFN contacted some of the companies responsible for marketing salmon products in 2016/17, to find out how much soya had been consumed by the salmon sold in Norwegian grocery stores. Selected products from the Norwegian supermarket chains, Rema 1000 (*GodeHav* fillets, frozen salmon, smoked salmon and organic fillets), Coop (Coop fillets and smoked salmon, X-tra frozen salmon and *Änglamark* organic fillets), Norgesgruppen (*Fiskemannen* smoked salmon and fillets, and First Price smoked salmon and

fillets), were included in the survey, along with products from Norwegian aquaculture companies, Lerøy (*GladLaks* and Lerøy fillets, salmon loins and smoked salmon), Lofoten (fillets and smoked salmon), Findus (frozen fillets) and Salma (loins). Together, these manufacturers produce a large percentage of the salmon products on sale in Norwegian supermarkets.

The feed for Salma salmon comes from Ewos and BioMar. Salma's manufacturer, Bremnes Seashore, has its own feed formulas. They specify that the feed they used in 2016 contained, on average, 15.9% soya in feed from BioMar and 14.5% soya in feed from Ewos.<sup>146</sup>

The other four manufacturers of fish products who responded to our enquiry have stated that their salmon products have been given feed supplied by Skretting, Ewos and BioMar, but have not stated how much feed they get from each supplier. This applies to products from Lerøy, Lofoten, Rema 1000 and Coop.<sup>147</sup>

There is so much variation in manufacturers' responses regarding the soya consumption of their salmon that we suspect they don't have a complete overview of this. But given that Skretting and Ewos have a higher percentage of soya in their feed and are much larger manufacturers than BioMar, there is reason to believe that the average soya content in the feed that salmon from Lerøy, Lofoten, Rema 1000 and Coop eat is closer to Skretting's and Ewos' respective averages of 26 and 23% SPC, rather than BioMar's average of 14% in 2015.

On completion of this report, we had not yet received a response from Findus. Norgesgruppen had not given sufficient information about where they get their feed from or the soya content in their salmon products.

140 <http://hugin.info/209/R/2023118/751659.pdf> 16.02.17

141 Ibid.

142 [http://sysla.no/2016/09/13/havbruk/dette-er-norges-20-storste-oppdrettselskaper\\_155502/](http://sysla.no/2016/09/13/havbruk/dette-er-norges-20-storste-oppdrettselskaper_155502/) 16.02.17

143 <http://ilaks.no/ingen-nye-storaksjonaerer-i-marine-harvest/> 8.2.17

144 <https://www.leroyseafood.com/Investor/Investor-/Storste-aksjonarer/> 8.2.17

145 <http://www.salmar.no/20-storste-aksjonarer> 8.2.17

146 Stated in an email to RFN and FIVH dated 2017.

147 Ibid.



Photo: Thomas Maier

#### 4.5 Organic salmon is a positive exception

There are salmon products available in Norwegian supermarkets that generally contain less soya and where the soya contained has not been produced under the problematical conditions described earlier — those labelled organic. Organic aquaculture is governed by the *Regulation on organic aquaculture production and labelling of organic aquaculture products*.<sup>148</sup> According to the Regulation, the following raw materials for feed should be prioritised:

- organic feed products from aquaculture production
- fish meal and fish oil from trimmings from organic aquaculture
- fish meal, fish oil and ingredients from fish and fish offal which has already been caught for consumption in sustainable fisheries
- organic feed ingredients of vegetable or animal origin
- feed products which originate from whole fish from sustainable fisheries, which have been certified in relation to schemes that are recognised by the Norwegian Food Safety Authority

Consequently, vegetable-based raw materials for feed must be organically produced, and marine-based raw materials must come from either organic aquaculture, waste from the fish industry or be certified as sustainable.

Several of the salmon manufacturers supply organic alternatives to Norwegian grocery stores. Coop's own brand, Ånglamark, includes organic salmon in its product range. Coop states that this contains a maximum of 15% soya which has been organically produced and comes from China.<sup>149</sup> Lofoten's range of products includes organic smoked salmon. Lofoten states that this product is given feed that contains an average of 0.5 – 5% SPC.<sup>150</sup> Lofoten's manufacturer, SalMar, states that the feed for its organic salmon comes from Ewos' feed factory in Great Britain.<sup>151</sup> According to Ewos, the feed contains organically-grown soya from China.<sup>152</sup> The production of this soya should not contribute to deforestation or use pesticides.

<sup>148</sup> <https://lovdata.no/forskrift/2015-07-07-879> 10.02.17

<sup>149</sup> Stated in an email to RFN and FIVH dated 2017.

<sup>150</sup> Ibid.

<sup>151</sup> Ibid.

<sup>152</sup> Ewos, 2017. Replacement of fishmeal by agricultural origin ingredients in feed for organic farming.

## 5. Certification and other measures to ensure sustainable production

There are different ways to ensure that the raw materials one buys are sustainably produced. The most commonly-used measure is to buy certified raw materials. While certification has a number of advantages, it is important to be aware of the weaknesses associated with different certification schemes, as well as acknowledging that certification is not suited to solving problems created by rapid growth in demand for a product, as is the case with soya.

Certification is meant to guarantee that the particular product you buy has not contributed to, for example, deforestation, violations of human rights or excessive use of pesticides.

Different certification schemes vary in quality. To what extent an individual raw material is actually sustainable depends on the criteria specified by the scheme and how this is followed up in practice.

Buying certified raw materials can be an important step towards securing more sustainable raw materials, but it is not enough on its own. The certification schemes are rarely sufficient in themselves and should therefore be accompanied by additional requirements and close control. These additional requirements could, for example, cover aspects not sufficiently covered in the criteria of the certification scheme, or demand transparency.

In addition to assuring that those raw materials one receives have been produced according to the standards one desires, it is important to buy from producers who are able to satisfy the same requirements at all stages of the value chain. Certification schemes often only cover a very small part of the production of producers who sell certified products. In other words, a customer who buys a certified product only takes responsibility for that particular product, rather than guaranteeing the standards of the producer's operations generally.

It doesn't help much to buy sustainable niche products if the company one buys from, or its supplier, supplies other manufacturers with large quantities of non-sustainable raw materials.

Unfortunately, the problem is not solved even if one takes all the necessary precautions to ensure that the goods one buys really are sustainably produced. In industries with substantial growth in demand and uncontrolled expansion, the only way to avoid contributing to this demand and expansion is to reduce consumption of the product.

### 5.1 Certification through ProTerra

In Norway, manufacturers of food and feed are required to use soya that is non-GMO. The two most common certification schemes for non-GMO soya are Roundtable for Sustainable Soya (RTRS)<sup>153</sup> and ProTerra.<sup>154</sup>

In many areas, ProTerra has the best criteria of the two, but it lacks independent checking routines and the reports with their findings are not publicly accessible. This makes it impossible for consumers and others to know whether the soya really does fulfil the requirements of certification. RTRS allows more access but has a weaker set of criteria.

Most of the soya that fish feed manufacturers import into Norway is certified according to the ProTerra standard.<sup>155</sup>

### *Checking routines and transparency*

ProTerra practices a low level of transparency compared to a number of other certification schemes.<sup>156</sup>

For example, it does not give any information about the farms which produce ProTerra certified soya. This is criticisable and does not conform to international standards for good practice for certification schemes, such as those of the ISEAL Alliance.<sup>157</sup>

Another fundamental problem with ProTerra is that the certification scheme is not sufficiently independent; it does not have an independent controlling body. The Chairman of the Board of the ProTerra Foundation is also the CEO of ProTerra's certification body, Cert ID Brazil.<sup>158</sup>

#### Criteria for deforestation

ProTerra demands that soya must not be planted in 'natural forest or areas of high conservation value' (HCV<sup>159</sup>) which have been deforested since 2004. Furthermore, they stipulate that there must be a special focus on 'natural forest, vegetation along riverbanks, wetlands, marshes, flood plains, steep hillsides and other areas of high conservation value.' This appears to be a good requirement with regards to deforestation but it has some serious weaknesses. For example, it fails to define the different categories, therefore allowing too much room for interpretation. In addition, degraded forest<sup>160</sup> is not covered in a satisfactory manner.

153 <http://www.responsiblesoy.org/?lang=en>, 10.02.2017

154 <http://www.proterrafoundation.org/>, 10.02.2017

155 Response to RFN's feed survey in 2016.

156 <http://www.standardstmap.org/>, 10.02.2017

157 <http://www.isealliance.org/>, 10.02.2017

158 <http://www.standardstmap.org/identify/>, 10.02.2017

159 <https://www.hcvnetwork.org/about-hcvf/>, 10.02.2017

160 This is forest which has been affected by some form of human activity, but which still offers some important ecosystem services.

### *Criteria for pesticides*

When it comes to the issue of pesticides, ProTerra's criteria are not strong enough. According to criterium 9.6.2., a great number of controversial pesticides are not permitted to be used on plantations which supply ProTerra-certified soya. This soya must not be grown using pesticides such as those:<sup>161</sup>

- characterised by the World Health Organisation (WHO) as extremely, highly or moderately hazardous<sup>162</sup>
- on the Pesticide Action Network's (PAN) list of highly hazardous pesticides<sup>163</sup>
- included in the Rotterdam Convention<sup>164</sup>
- included in the Stockholm Convention<sup>165</sup>
- prohibited by local, national or regional laws

Altogether, these lists cover many of the most controversial pesticides in Brazil. For example, paraquat is covered on the WHO list of moderately hazardous pesticides, glyphosate is included on PAN's list of highly hazardous pesticides and endosulfan is included in the Rotterdam Convention.

Unfortunately, however, the subsequent criterium appears to cancel out the preceding one. According to criterium 9.6.3., soya growers can be certified even if they use pesticides on the lists above, as long as they are permitted under Brazilian legislation and the grower has a plan to reduce their use, i.e. *'shall implement a program of progressive reduction over time'*.<sup>166</sup> There is no time limit placed on such reduction programs. So, ProTerra labelling does not guarantee that the soya has been produced without using the most hazardous pesticides.

161 ProTerra Standard, criterion 9.6.2. See ProTerra Standard, page 28. Available at: [http://proterrafoundation.org/files/ProTerra\\_Standard\\_V3\\_o\\_EN.pdf](http://proterrafoundation.org/files/ProTerra_Standard_V3_o_EN.pdf) 06.02.17

162 [http://www.who.int/ipcs/publications/pesticides\\_hazard\\_2009.pdf?ua=1](http://www.who.int/ipcs/publications/pesticides_hazard_2009.pdf?ua=1) 06.02.17

163 [http://www.pan-germany.org/download/PAN\\_HHP\\_List\\_150602\\_F.pdf](http://www.pan-germany.org/download/PAN_HHP_List_150602_F.pdf) 06.02.17

164 <http://www.pic.int/TheConvention/Overview/TextoftheConvention/tabid/1048/language/en-US/Default.aspx> 06.02.17

165 <http://chm.pops.int/TheConvention/Overview/TextoftheConvention/tabid/2232/Default.aspx> 06.02.17

166 ProTerra Standard, criterion 9.6.3. See ProTerra Standard, page 28. Available at: [http://proterrafoundation.org/files/ProTerra\\_Standard\\_V3\\_o\\_EN.pdf](http://proterrafoundation.org/files/ProTerra_Standard_V3_o_EN.pdf) 06.02.17



## 5.2 Is the soya bought by Norwegian feed manufacturers sustainably produced?

### *Certification*

Most of the soya imported for use in fish feed on the Norwegian market is, according to the manufacturers themselves, certified through the ProTerra scheme. According to this scheme, it should be possible to trace the soya back to a group of certified farms.

Skretting, Ewos and BioMar state that 100% of their soya was certified by ProTerra from 2016. Marine Harvest state that they do not demand certification for the soya they buy, while Polarfeed states that 100% of their soya is certified according to either ProTerra or the RTRS scheme.<sup>167</sup>

ProTerra certification provides the main means by which Norwegian fish feed manufacturers seek to ensure that the soya they buy is sustainably produced. However, we can see that ProTerra's requirements are neither good enough nor clear enough. The lack of transparency with regard to its findings and the lack of independent checking routines create major obstacles when trying to ascertain whether the scheme actually ensures that certified soya is sustainably produced.

If ProTerra certification is to form a main element in ensuring the sustainable production of soya, then the criteria must be improved and ProTerra must become a transparent and independent certification scheme.

Ethical guidelines and procurement policies

In addition to buying ProTerra-certified soya, several of the fish feed manufacturers also have their own sustainability policies, ethical guidelines and similar documents. A number of these have requirements for avoiding deforestation, conflicts with local communities and the use of dangerous pesticides. The problem is that the measures used to ensure this are often unclear or insufficient. In general, feed manufacturers use ProTerra's certification scheme as their main control mechanism for ensuring that the soya they buy is sustainably produced according to the standards they require. But as we explain in this report, ProTerra has weaknesses with regard to both deforestation and the use of pesticides.

**Skretting** is owned by the feed manufacturer Nutreco and follows their Code of Conduct.<sup>168</sup> According to this, the agricultural products that Skretting buys should not contribute to deforestation and producers should make efforts to reduce the use of pesticides, minimise environmental pollution and avoid harming people's health and welfare.<sup>169</sup> However, Skretting states that its soya suppliers are ProTerra certified, which they deem provides sufficient third party verification, rendering any additional auditing in accordance with Nutreco's Code of Conduct unnecessary.<sup>170</sup>

**Ewos** has its own Code of Conduct for its suppliers<sup>171</sup> and a set of guidelines for ensuring that feed is sustainably produced.<sup>172</sup> Ewos is committed to using non-deforestation raw materials in accordance with the New York Declaration on Forests, which specifies that all deforestation shall be eliminated from the company's value chains within 2020.<sup>173</sup> With regard to soya, ProTerra certification is considered to provide Ewos with a guarantee against deforestation.<sup>174</sup>

**BioMar** has a Code of Conduct which focuses on workers' rights<sup>175</sup> and a purchasing policy for the purchase of raw materials.<sup>176</sup> All of the soya they buy to use in the manufacture of Norwegian feed is ProTerra certified. BioMar does not purchase soya grown in areas within the Amazon which were deforested after 1994.<sup>177</sup> Their purchasing policy does not, however, refer to the problems linked to the use of pesticides.

168 Nutreco Supplier Code of Conduct, supplement for agricultural products. Available at: <http://www.nutreco.com/globalassets/from-root/nutreco-supplier-code-of-conduct.pdf>

169 Ibid.

170 Specified in RFN's feed survey in 2016.

171 <http://www.ewos.com/wps/wcm/connect/ewos-content-group/ewos-group/sustainability/code-of-conduct-suppliers>, 17.02.2017

172 <http://www.ewos.com/wps/wcm/connect/ewos-content-group/ewos-group/sustainability>, 17.02.2017

173 UN 2014. Forests. Action Statements and Action Plans. Available at: <http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/07/New-York-Declaration-on-Forest-%E2%80%93-Action-Statement-and-Action-Plan.pdf>

174 <http://www.ewos.com/wps/wcm/connect/ewos-content-group/ewos-group/sustainability>, 17.02.2017

175 [http://www.biomar.com/Global/Global%20sustainability%20portal/illustrations%20and%20pictures/New/BioMar%20CoC\\_v8.pdf](http://www.biomar.com/Global/Global%20sustainability%20portal/illustrations%20and%20pictures/New/BioMar%20CoC_v8.pdf), 08.02.2016

176 <http://www.biomar.com/Global/Global%20sustainability%20portal/illustrations%20and%20pictures/New/BioMar%20Sourcing%20Policy.pdf>, 08.02.2016

177 <http://www.biomar.com/Global/Global%20sustainability%20portal/illustrations%20and%20pictures/New/BioMar%20Sourcing%20Policy.pdf>, 08.02.2016

**Marine Harvest** has its own policy for the manufacture of sustainable salmon feed, which demands zero deforestation and respect for the rights of small farmers, workers and indigenous peoples. According to the policy, the certification schemes of ProTerra and RTRS are considered to be sufficient in ensuring that these demands are met.<sup>178</sup> However, Marine Harvest does not stipulate that the soya they buy must be certified; they merely require their suppliers to be members of ProTerra or RTRS.<sup>179</sup> This is criticisable, since membership in one of these schemes does not guarantee that the soya Marine Harvest purchases is, in fact, certified. **Polarfeed** states that all of their soya is certified by RTRS or ProTerra.<sup>180</sup> They do not say whether they have any additional guidelines stating their requirements for soya production, nor is this mentioned on their website.

### *Lack of transparency*

Transparency is a prerequisite for making successful improvements to this industry. Transparency concerns trust and reliability, and contributes to moving the industry in the right direction.

The ProTerra certification scheme does not provide information about sub-suppliers or production conditions in the same way as other certification schemes. On the website of the RTRS certification scheme, for example, we can easily find lists of sub-suppliers and download reports of farm inspections.<sup>181</sup> Lists of sub-suppliers are not readily accessible on the websites of Norwegian feed manufacturers, even though this is becoming the norm in other industries. The annual sustainability reports of the feed manufacturers fail to address the problems faced or improvements carried out by sub-suppliers.

On the whole, there is little information available about the plantations where the soya that ends up in Norwegian fish feed is cultivated. The feed manufacturers have plenty of room for improvement in this respect.

### *Sustainable enough?*

Norwegian feed manufacturers still have problems in ensuring that the soya they buy is sustainably produced. Even more importantly though, as previously mentioned, these problems would not be solved

178 'Marine Harvest Policy on Sustainable Salmon Feed', sent to RFN via email, dated 27.05.2016.

179 Response to RFN's feed survey in 2016.

180 Ibid.

181 <http://www.responsiblesoy.org/public-audit-reports/?lang=en> 07.03.17

even if feed manufacturers were able to ensure that all they soya they buy really is sustainably produced according to the highest standards. This is because global demand is continuing to increase, contributing to pushing the uncontrolled expansion that we see in the industry. The only way to avoid contributing to this is to reduce soya consumption.

Ewos<sup>182</sup> and Skretting<sup>183</sup> state that they are both making efforts to find alternative protein sources for feed. But neither Skretting, Ewos, BioMar nor Marine Harvest have concrete plans to reduce their soya use in the coming years.<sup>184</sup>

## 6. Alternatives to soya in fish feed

SPC is used in fish feed to give salmon essential protein. A reduction in the soya consumption of the aquaculture industry is dependent on finding other protein sources. In the following pages, different alternatives to soya in fish feed are reviewed.

### 6.1 Marine-based raw materials

Fish meal is a familiar protein source in Norwegian fish feed. Due to overfishing of a range of fish stocks, the conflict between foodstuffs that can be used directly for human consumption or fish feed, and other environmental and social problems, Norwegian fish feed manufacturers have reduced marine-based protein sources in favour of vegetable-based ones. According to the Food Research Institute in Norway, Nofima, marine-based protein sources in Norwegian fish feed were reduced from 65 to 13% between 1995 and 2013. Vegetable-based protein sources increased from 0 to 37% in the same time period.<sup>185</sup> In the sustainability reports of Norwegian fish feed manufacturers, it emerges that this has been a conscious change and that several manufacturers have a goal to reduce the use of marine-based protein sources further.<sup>186</sup>

In 2013, 25% of fish meal was produced from offal and waste from the fish industry,<sup>187</sup> including fish heads, backbones and diverse other parts.<sup>188</sup>

182 <http://www.ewos.com/wps/wcm/connect/ewos-content-group/ewos-group/sustainability>, 08.02.2017

183 Response to RFN's feed survey in 2016.

184 Ibid.

185 Nofima, 2014. Resource utilisation of Norwegian salmon farming in 2012 and 2013. Page 7.

186 For example, see Skretting Norway, 2016. Sustainability Report 2015.

187 Nofima, 2014. Resource utilisation of Norwegian salmon farming in 2012 and 2013. Page 11.

188 <https://laksefakta.no/hva-spiser-laksen/hva-er-i-foret-til-laksen/> 25.01.17

The use of offal from the fish industry can be seen as a win-win situation; farmed fish do not directly cause overfishing but rather utilise a resource that might otherwise end up as waste material.

Most of the fish meal is, however, made from small pelagic fish which are caught along the South American coast or in the North Atlantic.<sup>189</sup> The fish species anchoveta, caught off the coast of Peru and Chile, represents half of the small fish content in fish meal used in Norwegian fish feed.<sup>190</sup> Capelin, caught in the North Atlantic, represents a quarter of the small fish content.<sup>191</sup> These species of fish are not classified as endangered,<sup>192</sup> but the use of Peruvian anchoveta in Norwegian aquaculture has provoked discussion due to local problems.<sup>193</sup> FAO (Food and Agriculture Organisation of the United Nations) has, for example, expressed the viewpoint that a greater percentage of the anchoveta catch should be used as human food for the poor in Peru.<sup>194</sup> At present, most of the small fish are used in fish feed for the global market. While the use of anchoveta and capelin in fish feed does not represent a threat to these species, there are other environmental and social problems linked to this form of consumption.

Overfishing and the destruction of oceanic ecosystems has been placed on the agenda by international organisations such as FAO and a number of environmental organisations, in addition to national authorities through their regulation of fishing. Every third fish stock is considered to be overfished today, and 53% are completely used up.<sup>195</sup> To address these problems, a range of certification schemes have been established, as well as labelling fish which fulfils certain environmental criteria.

In 2010, a certification scheme for farmed fish, the Aquaculture Stewardship Council (ASC), was established. It stipulates different criteria for different types of fish production. The criteria for

farmed salmon deals with the topic of raw materials for feed, living conditions and escape.<sup>196</sup> With regard to marine-based raw materials for feed, ASC have set up the following criteria:<sup>197</sup>

- the species of fish to be used in feed must not be endangered or low in numbers locally
- fishing equipment that damages the habitat or vulnerable species must not be used
- the area to be fished must have approved management plans

The ASC label does not, however, give any guarantee that catching this fish has not had negative effects on the ecosystem (e.g. large catches of individual fish species can affect endangered species if they are a food source for the latter), or that the export of the fish product to Norway is not in conflict with local access to food where the fish was caught. We can say that ASC addresses some, but not all, of the problems associated with catching wild fish.

#### 6.2 Vegetable-based raw materials

In 2012-13, seven different plant products were used as protein sources in Norwegian fish feed: SPC, wheat gluten, sunflower seed meal, pea protein concentrate, fava beans, broad beans and maize.<sup>198</sup> In other words, different types of plants are already being used as a source of protein in Norwegian fish feed. In terms of tonnage, however, more than half of the vegetable-based inputs used to add protein to feed is SPC.<sup>199</sup> The large consumption of SPC in preference to other vegetable-based protein sources is partially attributable to protein effectiveness. SPC has a very high protein content.<sup>200</sup> Availability, price and salmon's ability to absorb nutrients from the different products is also decisive with regard to the choice of vegetable-based protein sources. However, availability, price and protein content are not static factors; over time, they may be influenced by innovation, demand and access to capital.

189 Nofima, 2014. Resource utilisation of Norwegian salmon farming in 2012 and 2013. Page 11.

190 Nofima, 2014. Resource utilisation of Norwegian salmon farming in 2012 and 2013. Page 13.

191 Ibid.

192 IUCN Red list of threatened species. Available at: <http://www.iucnredlist.org/> 25.01.17

193 <https://www.nrk.no/dokumentar/fiskeoppdrett-tommer-havet-1.6527787> 31.01.17

194 Sanchez, N & M. Gallo. 2009. Status of and trends in the use of small pelagic fish species for reduction fisheries and for human consumption in Peru. In: M.R. Hasan and M. Halwart (eds). Fish as feed inputs for aquaculture: practices, sustainability and implications. FAO Fisheries and Aquaculture Technical Paper. No. 518. Rome, FAO. pp. 325-369. Available at: <http://www.fao.org/3/a-i1140e/i1140e08.pdf> 15.02.17

195 [http://www.wwf.no/dette\\_jobber\\_med/hav\\_og\\_kyst/baerekraftige\\_fiskerier/](http://www.wwf.no/dette_jobber_med/hav_og_kyst/baerekraftige_fiskerier/) 30.01.17

196 [http://www.asc-aqua.org/upload/ASC%20Salmon%20Standard\\_v1.o.pdf](http://www.asc-aqua.org/upload/ASC%20Salmon%20Standard_v1.o.pdf) 30.01.17

197 <https://www.msc.org/healthy-oceans/sustainable-fishing/sustainable-fishing> 30.01.17

198 Nofima, 2014. Resource utilisation of Norwegian salmon farming in 2012 and 2013. Page 13.

199 Ibid.

200 The protein content of SPC varies among manufacturers and products; it is between 60-90%.

### 6.3 Seaweed and kelp

Foods of Norway,<sup>201</sup> a centre for research-based innovation, has developed technology which makes it possible to use brown algae as a protein source in fish feed. Macroalgae (seaweed and kelp) is, in itself, low in nutrition, but with bio-refinement, the algae are transformed into sugar and other nutrients with the help of enzymes. These nutrients are used to produce yeast which is an excellent source of protein in feed.<sup>202</sup> Foods of Norway is now developing a cost-effective method to provide the foundation for commercial production.<sup>203</sup>

With Norway's long coastline, brown algae can be cultivated on a large scale here. At present, there is little cultivation of seaweed and kelp in Norway, but a pilot farm has been established which has good prospects for the future. A total of 30 licences for such farms have been granted. One of the largest operators is Seaweed Energy Solutions (SES).<sup>204</sup> SES has a pilot farm for cultivating seaweed and kelp off the coast of Frøya in South Trøndelag county.<sup>205</sup> Although annual production is moderate at present, this is one of the largest farms for seaweed and kelp cultivation in Europe.<sup>206</sup>

### 6.4 Wood chips

Chips from the Norwegian spruce industry can also be transformed into a high-value protein source for fish feed by bio-refining timber. A combination of chemical and enzymatic processes is used to break down wood fibres which can be used in a range of products. One of these products is sugar, which can be used a growth medium for the production of yeast. This yeast can then be used as a high value protein source in fish feed.<sup>207</sup> The technology is complete and work is being done to make it more effective, so that yeast can be produced at a competitive price. There are large quantities of spruce in Norway and yeast production for fish feed can easily be based on both refuse from the timber industry and other parts of the

tree which are not used for timber.<sup>208</sup>

The technology and raw materials are available; the next step is to raise the political will to utilise this knowledge and provide the venture capital for an industrial-scale investment in Norway.

### 6.5 Insects

Insects reared on food waste could provide another sustainable raw material for feed. Insect meal could function as a replacement for soya because it is very rich in protein.<sup>209</sup> [1] In the research project ENTOFÖR, research is being done on farming insects on food waste. Different insects can transform all sorts of organic materials, such as food waste from agriculture and food manufacturing, and brewer's grain.<sup>210</sup> [2] At present, insect farming is a marginal industry in Europe but, as of summer, it will be legally permissible to add insect meal to fish feed in the EU and EEA. Norinsect in Sunnmøre, Møre and Romsdal county, has established a commercial production facility to produce flour beetle larva, and would like to open several more farms across the country.<sup>211</sup> [3]

### 6.6 Sustainable alternatives

The transformation of brown algae and wood chips into protein sources for fish feed has been developed on the basis of a need for sustainable feed sources. During the development of this technology, it has been of central importance to find protein sources that solve the problems associated with the production of existing protein sources, such as soya and fish meal. Furthermore, the technology has been developed based on a circular economy rather than a traditional value chain.<sup>212</sup>

Algae and wood chips will not require the occupation of arable land in the same way that soya cultivation does and, consequently, will not lead to the risk of deforestation of rainforest or savannah woodland, or conflicts with local small farmers and indigenous peoples. Algae can be cultivated in the ocean along the coast, and wood chips are available in large amounts in the existing Norwegian spruce forests.

For the research team at Foods of Norway, the goal has been to find raw materials for feed which

201 <https://www.foodsofnorway.net/about> 30.01.17

202 <http://forskning.no/2016/02/store-alger-gir-ny-naering> 30.01.17

203 Interview with Professor Margaret Øverland, Director of research project Foods of Norway, 12.01.17

204 <https://www.tu.no/artikler/de-vokser-fra-1-centimeter-til-1-5-meter-pa-fem-maneder-na-kan-de-bli-var-nye-milliardindustri/346608> 30.01.17

205 <http://www.seaweedenergysolutions.com/en/commercial-projects/pilot-farm-norway> 30.01.17

206 Ibid.

207 Interview with Professor Margaret Øverland, Director of research project Foods of Norway, 12.01.17

208 Ibid.

209 [1] <http://www.nibio.no/nyheter/insekt-skall-gjere-avfall-om-til-dyrefor> 21.02.17

210 [2] Ibid.

211 [3] Ibid.

212 Interview with Professor Margaret Øverland, Director of research project Foods of Norway, 12.01.17

The soya industry in South America is expanding to the detriment of rainforest and other vulnerable forest areas.  
Photo: Jim Wickens/Ecostorm



can be produced locally.<sup>213</sup> Currently, 90% of the raw materials for feed are imported, which entails risks for both feed manufacturers and consumers. The local production of raw materials for feed will make availability more dependable and predictable.

As protein sources, algae and wood chips can help contribute to the goal of stopping global overfishing and prevent the huge sustainability problems associated with fishing for the raw materials for fish meal. Wild fish will be preserved and ocean ecosystems will not suffer as a consequence of the production of farmed fish.

The fact that these raw materials for feed will not demand using wild fish resources or the occupation of arable land has yet another positive consequence – the production of raw materials will not create competition with the production of food for human consumption. Wild fish are a source of human food, either directly or indirectly as part of the diet of the fish that humans eat. Arable land can be used to cultivate food directly for humans, instead of cultivating feed for fish that are eaten by humans. This food perspective is inextricably linked to climate change, which will potentially reduce the basis for producing human food in the years to come, and not least, lead to the inequitable global distribution of food. Small farmers in Brazil want arable land to cultivate food for the local market, but they are fighting a tough battle for land with the soya industry. In Peru, there is less fish available for human consumption because the source of its sustenance is being used in the production of fish meal for aquaculture in industrialised countries.

The new raw materials for feed may also potentially create employment. Algae cultivation along the coast could replace some of the jobs that have been lost in the oil industry. The refinement of wood chips could provide a lift for the forestry industry, which has been in decline as the result of the closure of several cellulose factories over the past few years.

Yeast produced from algae and wood chips contains almost as much protein as SPC. The yeast contains between 50-60% protein, while SPC used in Norwegian fish feed contains 60% protein.<sup>214</sup> Therefore, biomass can function as a satisfactory substitute for protein in fish feed.

The necessity of a protein source for fish

feed must also be seen in relation to the debate about how much protein is necessary in feed and how many farmed fish should be produced. The amount of protein in feed can vary. This affects the quality of the fish and the time it takes to produce an edible fish. It should be remembered that fish are currently reared on different quantities of protein and this will continue in the future. The dependency of the Norwegian aquaculture industry on large quantities of raw materials containing protein cannot be seen independently of the size of the industry. A fivefold increase in Norwegian aquaculture will clearly demand far larger quantities of raw materials containing protein than the amount consumed by the industry today.

## 7. Summary and recommendations

In Norway, large quantities of soya are consumed because fish and animals are fed on soya. Most of the soya is used in aquaculture. Almost all of the soya which is consumed by Norwegian salmon comes from Brazil. The soya industry in South America is expanding to the detriment of rainforest and other vulnerable forests and is causing serious environmental and health problems, such as the extensive use of toxic pesticides.

It is expected that global soya production will almost double within 2050, primarily due to the demand for soya in feed. As a consequence of our large consumption of soya in animal and fish feed, Norway contributes to this demand, which places great pressure on vulnerable natural habitats, such as rainforests and savannah woodland. As the world's largest producer of farmed salmon, Norway has a significant responsibility for ensuring that soya consumption does not lead to serious, negative consequences for people and the environment. This challenge becomes even greater in the light of the Norwegian authorities' ambition to increase aquaculture fivefold.

In this report, FIVH and RFN have examined the consumption of soya in the fish feed which is used in Norwegian aquaculture. We have seen how much land that the aquaculture industry, through its fish feed requirements, occupies in Brazil at present and also after the planned fivefold increase. Furthermore, we have seen whether we as consumers have access to salmon which contains less or no soya, and looked at possible solutions for the industry.

The report shows that strong measures are

<sup>213</sup> Ibid.

<sup>214</sup> Ibid.

required to prevent a fivefold increase in Norwegian aquaculture from having a highly negative impact on unique and vulnerable natural habitats and the people who live there.

#### *The soya industry creates extensive problems*

The soya industry in South America creates extensive problems. After the so-called 'Soy Moratorium' came into effect, deforestation of rainforest to make way for soya plantations in Brazil decreased significantly. Unfortunately, we see that the problems have simply been transferred to other countries and regions with less regulations and restrictions. The soya industry, together with cattle farming, is responsible for serious deforestation of rainforest in Bolivia, and of savannah woodland and other important ecosystems, not just in Brazil, but also in Paraguay, Bolivia and Argentina.

The cultivation of soya beans demands large tracts of arable land. Increasing demand for soya on the international market creates a dynamic in which steadily more small farmers and indigenous peoples are dispossessed of their land, or lose the forest which provides the basis of their existence. Paraguay and Brazil are among the countries with the most inequitable division of land in the world. In Brazil, there are 200,000 poor families that would like a plot of land to grow food on.

The soya industry is also one of the worst offenders in regard to the use of pesticides. At present, Brazil has the highest usage of pesticides in the world, and it is increasing. The soya industry uses 52% of the total amount of pesticides used in Brazil. Pesticides which are prohibited in Europe are used in Brazil. These pesticides are considered to be highly hazardous by international organisations and conventions. The plantations which are largely sprayed by crop dusters, can be situated up to 90 metres from dwellings, primary schools and sources of drinking water. Research shows there is a relationship between the use of pesticides and both cancer and congenital malformations.

#### *Soya consumption in Norwegian aquaculture*

In 2015, SPC equivalent to 677,394 tons of soya beans was imported into Norway. The cultivation of these beans required an area of about 2,250 km<sup>2</sup> in Brazil, the equivalent of almost three times the size of Berlin city. The area occupied by Norwegian aquaculture in Brazil is the size of 11,000 small farms on a Brazilian scale.

Ninety-six per cent of the SPC imported in 2015 was used by these fish feed manufacturers:

Skretting, Ewos, BioMar, Marine Harvest and Polarfeed. The fish feed produced by the three largest manufacturers, Skretting, Ewos and BioMar, contained 23% protein on average in 2013. The content varies between manufacturers. Fish feed produced by the two largest feed manufacturers in Norway, Skretting and Ewos, contained more soya on average than the feed produced by their competitors BioMar, Marine Harvest and Polarfeed.

#### *Difficult to ensure 'sustainable' soya*

Large quantities of the soya purchased by Norwegian fish feed manufacturers is certified through the ProTerra scheme. Unfortunately, the criteria are not good enough, allowing the deforestation of partially-degraded forest and allowing soya growers to be certified even if they use dangerous pesticides, so long as they have plans to reduce usage. In addition, ProTerra lacks independent checking routines and its reports are not available to the public. This makes it impossible for consumers and others to know whether the cultivation of soya used in Norwegian farmed salmon has contributed to deforestation or the hazardous use of pesticides. The lack of transparency is a huge obstacle to improvements.

Unfortunately, the problems will not be solved even if feed manufacturers manage to ensure that all the soya they buy is sustainably produced. This is due to the fact that global demand is still increasing and contributing to the uncontrolled expansion we see in the industry. To avoid contributing to this, the only solution is to reduce soya consumption.

#### *A fivefold increase in the aquaculture industry is not sustainable*

Unless the feed formula changes and the soya is substituted with other protein sources, the government's plan to increase the aquaculture industry fivefold will involve a fivefold increase in soya imports for use in fish feed in Norway. This will entail the occupation of over 11,000 km<sup>2</sup> of land in soya producing countries – an area that exceeds all of Norway's productive agricultural land in 2016.

A fivefold increase in soya consumption in Norwegian fish feed is irresponsible. The increasing global demand for soya is contributing to large-scale environmental damage and social conflicts. Therefore, we are very critical to the planned fivefold increase in Norwegian salmon farming. On the basis of the problems the soya industry is

creating in South America, RFN and FIVH would rather see a reduction than an increase in Norwegian soya consumption.

To avoid contributing to the growth of an industry that has no control over its production and expansion, the Norwegian aquaculture industry should seek out sustainable alternatives for raw materials in fish feed and reduce soya consumption. The aquaculture industry has shown the will and ability before to reduce the use of other non-sustainable raw materials in feed, and we look forward with pleasure to a change in regard to soya consumption.

Alternatives: organic salmon

When we surveyed the use of soya in the Norwegian aquaculture industry, we also wanted to see if there were sustainable salmon products that did not contain soya available in grocery stores. At present, virtually all fish feed manufactured in Norway contains SPC from Brazil. None of the conventional salmon products on sale in the supermarket today are soya free. Organically labelled farmed salmon stands out as a positive exception. The feed that is used for organic fish must be organically produced and, therefore, cannot be produced using pesticides or cultivated in deforested areas. Endangered species of wild fish cannot be used in organic feed either. Our investigation shows that the soya content in feed for organic salmon is lower than that for 'conventional' farmed salmon.

### *Exciting alternatives for feed*

There are alternative protein sources which can be used in Norwegian fish feed. The industry already uses different plants as a source of protein. Sustainable production of these will be able to replace a portion of the soya protein consumption. Furthermore, there is a great potential in wood chips, seaweed and kelp as raw materials for feed, which is exciting. The technology and the raw materials are available, and it is important to see how both the Norwegian authorities and the industry itself can contribute to making sustainable alternatives commercially viable.

### **7.1 Recommendations**

RFN and FIVH urge the Norwegian feed industry to reduce its soya consumption. It is especially vital that the use of soya does not increase proportionally with the ambition of a fivefold increase in the aquaculture industry. Furthermore, feed manufacturers must be able to ensure and prove that

the soya they buy comes from companies which produce soya sustainably. This means that soya producers must be able to show that they do not contribute to deforestation of rainforest or other ecosystems, violations of local communities' and indigenous peoples' rights, or that their operations lead to environmental and health-related problems, such as those caused by the extensive use of toxic pesticides.

## What can businesses in the fishing industry do?

- Reduce their soya consumption.
- Develop sustainable salmon feed and salmon products without using soya.
- Label salmon products that have been fed with soya.
- Ensure that the protein sources they substitute soya with are produced in sustainable ways.
- Support the development and production of sustainable protein sources, such as insects, yeast from brown algae and wood chips.
- Introduce and implement unified company policies which ensure that the suppliers they buy soya from (i) are not jointly responsible for deforestation and destruction of rainforest or other important ecosystems, (ii) have not contributed to human rights' violations, or (iii) have not contributed to other serious environmental and health-related problems.
- Obtain a complete overview, be open about where the soya comes from and the conditions under which it is produced.
- Support the Cerrado Manifesto for Brazil's savannah biome, the Cerrado.
- Produce organic salmon and request organic soya from suppliers.
- Make efforts to ensure that the certification scheme/s that are used have good clear criteria, independent checking routines and that they are open about their findings.

## What can Norwegian consumers do?

- Contact their local grocery store and/or salmon manufacturers to ask for salmon products without soya, as well as requesting that salmon products fed on soya are labelled as such.
- Buy organically labelled salmon.
- Demand that companies do not import or use soya that has been cultivated in deforested rainforest or other important ecosystems, contributed to human rights' violations, or been sprayed with large amounts of toxic pesticides.

## What can the Norwegian Government do?

- Contribute venture capital to the building up of a new and sustainable industry for the development of alternative protein sources for fish feed.
- Have unified policies regarding rainforest conservation, including the implementation of regulations for government procurement which ensure that goods purchased are non-deforestation.
- Increase the funding for the research and production of sustainable raw materials for animal and fish feed.
- Demand traceability and complete openness about supply chains from businesses.
- Support the Cerrado Manifesto for Brazil's savannah biome, the Cerrado.

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