

Sphagnum moss: issues associated with the sustainable development of a non-timber forest product in New Zealand

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ABSTRACT

As conventional forestry has declined in New Zealand's indigenous rainforests, a multimillion-dollar activity, based on the harvesting and processing of a non-wood forest product, has boomed. In New Zealand, this non-wood forest product, sphagnum moss, usually grows in bogs at altitudes from 2000 metres down to sea level, but is found particularly on the West Coast of the South Island growing in swamps and cutover forest. The nature and history of this export-oriented industry, present issues and implications for its sustainable development, are discussed in this paper.

Keywords: Sustainable development; sphagnum moss; non-timber forest product; New Zealand.

SPHAGNUM MOSS

Conditions are especially favourable for the growth of sphagnum moss on the West Coast of the South Island where there is a warm temperate climate in the lowlands and a mean annual precipitation of 2000 to 3000 mm at the coast rising to over 6000 mm at high elevations. As moss favours low nutrient and high moisture levels, ideal growing conditions on the West Coast are found in extensive cutover forest, swampy land, old mining sites and on areas grazed and regularly burnt.

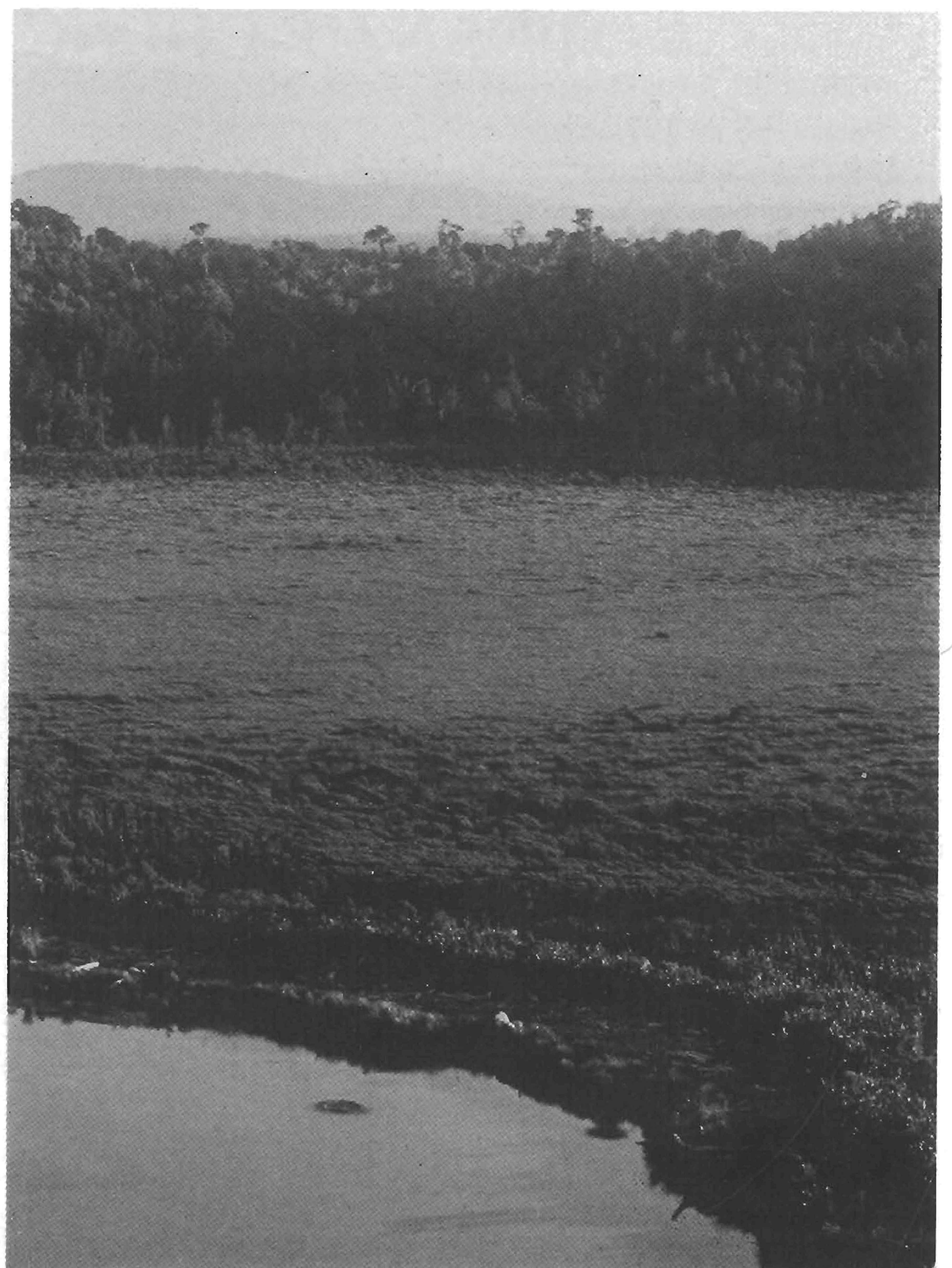
MOSS HARVESTING AND PROCESSING

Although most of the commercial moss harvest in New Zealand comes from the West Coast, a small-scale operation has started in Southland and harvesting applications have been lodged in the Nelson, Otago and Wanganui regions too. Generally, other localities are less favourable than those on the West Coast and many potential sites occur in areas administered by the Department of Conservation (DOC). DOC allows harvesting only where conservation values are not threatened, usually on sites substantially modified by previous land uses. Harvesting is prohibited in national parks, reserves, wildlife sanctuaries and other protected areas (DOC n.d.).

Moss has been harvested for many years but the industry did not develop until export orders were secured in Japan in about 1970 (Denne 1982). Although there are five species of sphagnum moss on the West Coast, harvesting is largely restricted to one species, *S. cristatum*. It is picked by hand from wild stock and is not enhanced by artificial fertilisation or intensive management practices. In most cases it is harvested on a rotational basis every two to six years depending on market pressures and on regeneration, which varies from locality to locality, site to site. It is air-dried, in tunnel houses or in the open on racks, or dried in a kiln. The former is favoured by the industry as the resultant quality of the moss is better and it is less costly. However, inclement weather conditions limit the use of air drying.

Once sorted and dried, most of the moss is packed in bales for export where it is used mainly in the horticulture industry, particularly as a propagation medium for orchid bulbs. It is particularly favoured for this purpose because of its water-holding capacity of 12 to 14 times its own weight and because it is sterile and free of artificial chemicals (Buxton *et al*, 1990).

In the early days, licences were issued by the New Zealand Forest Service (NZFS) and the Department of Lands and Survey and a royalty was paid on the amount harvested. This practice changed soon after these departments were disbanded and restructured. In 1988 DOC started putting moss up for tender, which is based on the expected yield and value, but is constrained in exploiting this resource by its generally preservationist mandate. Output from the DOC estate has been estimated by industry sources to be between 25 and 70% of the total harvest. However, this is a speculative figure as records are confidential and an unknown quantity of moss is illegally harvested. Timberlands West Coast Ltd, on the other hand, has a statutory mandate to make profits and, accordingly, has been free to develop all the moss found on its estate. Not all of the estate administered by Timberlands is in prime forest, for it has taken over the administration of cutover forests, swamps and derelict sites. Many of



'Pakihi' wetland near Hari Hari. Photo: A.J. Tilling

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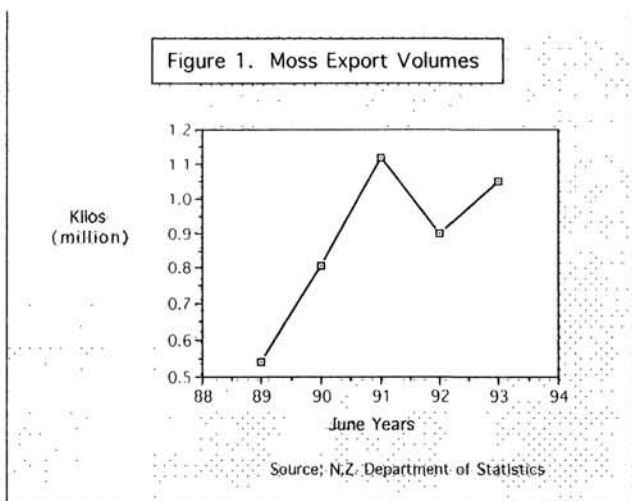
these contain sphagnum moss.

Private landowners also pick and process (dry, sort and pack) their own moss or send it to Timberlands or to private factories. DOC does not process any of the moss from its estate.

EXPORT VALUES AND MARKETS

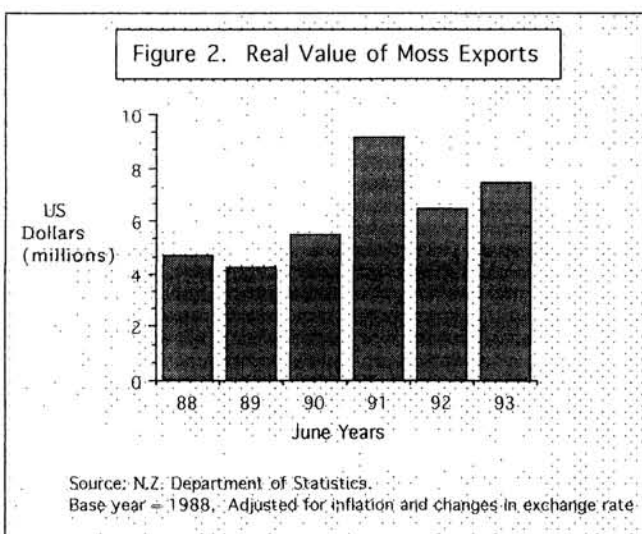
The industry has expanded considerably since the development of exports, though it is impossible to give accurate production figures as a separate category was created for this item by the New Zealand Department of Statistics only in late 1987. Prior to this, survey information indicates that approximately 200,000 dry kg of moss was produced during the 1984-1985 season (Tilling 1989). Most of this would have been exported.

Sphagnum moss is a multimillion dollar export industry. The first full year of export statistics began in 1988, with output continuing to grow until a peak in 1991, as shown in figure 1.



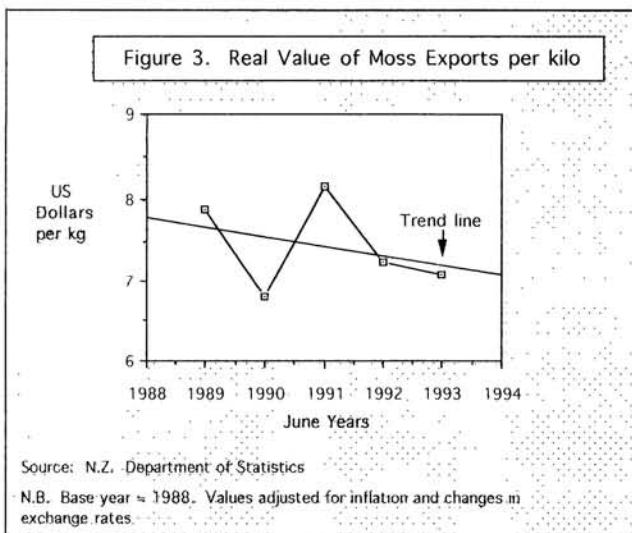
Most of the production is accounted for by 12 moss exporters on the West Coast and two in Southland, though a confidential source estimates that approximately 60% of exports are derived from three packing houses.

Similarly, the value of exports reached a peak in 1991, as is shown in figure 2.



1 The moss industry's return on sales was very high (70.3%) when compared with returns by other forest-based users, such as beekeepers (9.3%) and craftwoodworkers (3.6%). The rate of return on total assets was 280.9% compared with beekeepers (2.8%) and craftwoodworkers (1.4%).

In nominal terms the increase in value of moss exports was more dramatic, but a combination of the falling value of the New Zealand dollar against the US dollar and domestic inflation has reduced actual returns to producers. The high export value of moss per kilo in 1991 accounts for this being the most favourable year since reliable statistics have been published. However, in general, the trend in unit values has been downwards between 1989 and 1993, when adjustments are made for inflation and a falling New Zealand dollar, as shown in figure 3.



Although no official figures are available, industry sources suggest that prior to this date, unit values were increasing. Another reason for the apparent fall in prices since 1991 was a carry over of stocks of moss in Japan, which imports approximately 85% of New Zealand's exports. This put pressure on prices in the 1992 season, which was aggravated by the presence of a new packer and exporter in the market.

The heavy reliance of exporters on the Japanese market places the West Coast industry in a vulnerable position as the only other significant markets are also in the Far East: 10% of exports going to Taiwan and 4% to Korea. Only a small quantity of moss is used locally in New Zealand (possibly less than 3% of output [Chamberlain pers. comm.]).

Falling unit values could have a long-term effect on the profitability of the industry, although a survey of returns to a number of producers between 1984 and 1987 indicated that this has been a highly remunerative business (Tilling 1989).¹ Buoyant demand and insignificant inventories accounted for this. Labour charges and transport were the only significant costs and as these have not increased significantly in recent years, there is still reason to believe that moss processing and export is very profitable.

In order to increase returns and reduce risks, however, efforts are underway to diversify production: there is a move away from sales of 25 and 30 kg bales to smaller specialty packs and new end uses are sought, such as the market for moss as an absorbent in sanitary pads and surgical dressings.

Employment

Comprehensive, up-to-date data on the number of people working in the moss industry are not available, as this information is not provided by the New Zealand Census. It is also difficult to give precise figures because many people work on a casual and part-time basis. However, the numbers involved are not great.

The last comprehensive figures are derived from survey results for 1986-87 (Tilling 1989). Including proprietors, there were 111 full and part-time jobs in the 12 export houses operating at that time, providing the equivalent of 61 permanent full-

time jobs. However, these figures do not include casual moss pickers and farmers who might pick a few bales of moss a year. At the end of 1993, one major industry source suggested that there were no more than about 100 full-time equivalent jobs in the 14 export houses on the West Coast and in Southland, with possibly the equivalent of a further 80 full-time dry moss suppliers. Talk of up to 1000 full and part-time jobs in the industry is mere speculation as there has not been a recent comprehensive and reliable survey of the industry.

SUSTAINABLE DEVELOPMENT ISSUES

In view of the fact that there has been a high level of demand for moss and that the industry is reliant on "wild" stock, a nagging question is whether the recent buoyant activity can be sustained. This is a relevant concern, not just because sustainable development is in vogue following the Brundtland Commission (which defined sustainable development as "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*"), (World Commission on Environment and Development 1987), but because the continued prosperity of the industry is important to the West Coast region and those who derive a livelihood from it. Furthermore, there are general lessons to be learnt from the experiences of the moss industry which may be applicable to the development of other non-timber forest products.

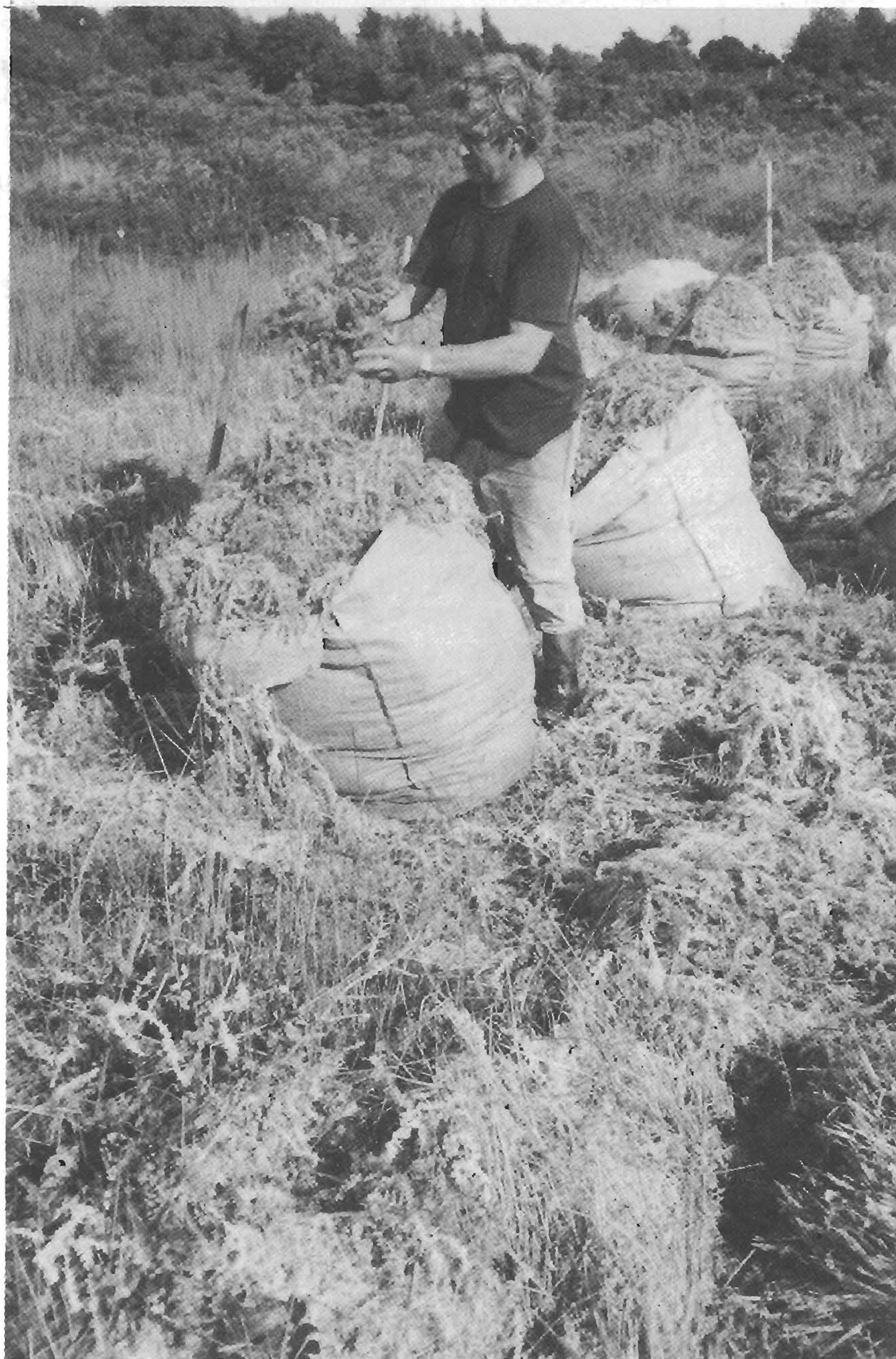
Uncertainty

Despite the fact that moss has been exported for over 20 years, little systematic research has been undertaken to determine the aerial extent, growth characteristics and expected future yield of moss; nor has there been much research into ways of enhancing production.

Early in the 1980s a growth trial was carried out by a government department but was abandoned after the Government introduced 'user-pays' charges for research, and producers failed to agree on making a financial contribution for it. Landowners and government agencies continued their own informal experiments, such as spreading 'fines' ('re-seeding' the leftovers after drying and sorting) and varying the frequency of harvesting.

Systematic scientific observations were only restarted in mid 1989, followed by field and laboratory studies in 1990 and 1991. These suggest that moss harvesting can be ecologically sustainable if care is taken and re-seeding resorted to. The lowlands have the most potential, but harvesting is not viable under montane forest (Buxton *et al* 1991).

Nevertheless, it is still impossible to determine with any certainty what constitutes a sustained yield. Instead, critical har-



Sphagnum moss harvested from wetland, Hokitika. Photo: A.J. Tilling.

vesting thresholds have been determined by a process of trial and error, with reported over-harvesting in some places. In the past, this caused irreparable damage or slower regeneration in some instances. However, with the restarting of research and several years of practical field experience by producers, there is hope that past mistakes will not be repeated.

As growth rates and moss yields vary considerably from site to site, location to location, it will be difficult to determine accurately potential sustainable yields from "wild" stock. Farming the resource would bring more certainty and assure a more uniform supply of moss (Tilling 1989, Tilling in press) but farming is still in an embryonic state.

Tenure and Informal Harvesting

During the 1970s and early 1980s, uncertainty arose from the low regard paid to this "minor" forest product by NZFS and the Department of Lands and Survey, manifested by the issuing of short-term harvesting licences. This did not encourage careful harvesting, as there was no guarantee that licences would be renewed.

Then, when government departments were being restructured, a very high level of concern about the future availability of moss was expressed by self-employed moss harvesters. This stemmed from changes to the way moss was allocated and charged for and from delays in the introduction of new policies (Tilling 1989). Under the old government departmental system, harvesters paid a royalty based on the amount harvested. But this system was open to abuse and little revenue was collected. Under the new tender system, bids are based on expected yields and value,



Wetland 'farmed' and 'ploughed' in an attempt to speed up the regeneration of harvested sphagnum moss, Hokitika. Photo: A.J. Tilling.

expressed as an annual rental. But, as there is yet no scientifically established method to determine moss yields, these are guess-timates. However, a royalty per wet tonne harvested is also payable.

Harvesting rights for up to five years are now issued by DOC. This has resulted in greater stability for harvesters. Individuals can also apply to harvest small blocks of moss identified by themselves. In such cases, licences are issued for up to 12 months, though the intention is to make them long-term. The Department and the applicant agree on a price which is paid prior to harvesting and revised during the harvesting process. Hence, these new systems are an improvement on the old ones, but they favour those with capital resources: usually large-scale organisations rather than individuals.

Timberlands initially adopted a more convenient administrative arrangement by entering into a long-term agreement with a private company to process all the moss under its control. This was then superseded by the formation of a joint company. Eventually Timberlands took over sole control of the venture, forming a subsidiary company, New Zealand Sphagnum Exports Ltd.

Changes in allocation rules caused anxiety and uncertainty amongst harvesters over their income prospects. Income is a consideration critical on the West Coast, as it is one of the most depressed economic regions in the country. Poor alternative employment prospects, caused by the peripheral location of the region, its inaccessible and rugged hinterland and sparse population (33,408 at the 1991 census) has bred a certain opportunism which can be likened to a frontier mentality. This is evident in the attitude, often cavalier, to resource development and the frequent disregard for bureaucratic rules and regulations. Some of

those who are excluded from harvesting moss resort to other measures to secure "their" share of the resource: helicopters have been used to swoop down and steal bales waiting to be legitimately hauled out of remoter areas. Moss on reserves has also been illegally harvested in this way. It is hard for public agencies to police this adequately, as they have neither the staff nor mobility to be everywhere.

The introduction of a withholding tax in April 1992 is said to have stabilised supplies (Chamberlain pers. comm.) as pickers are forced to quote an IRD (tax department) number on the sale of moss, and processors accepting false numbers are liable to prosecution. Notwithstanding, processors and government agencies will still have to rely on public cooperation and informants to keep harvesters honest.

Cooperation and conflict

Unfortunately, cooperation between the public and government agencies and amongst producers themselves has not always been forthcoming. In particular, there has been local antagonism towards DOC, as it has been perceived as a spoiler: preventing or hindering the development of indigenous forests and forest-based resources. In part, this is a conflict between those who wish to continue to exploit the environment for personal, short-term gains and those who take a longer-term view, with future generations in mind. Narrow, vested interests have led to the destruction of forests and associated ecosystems during the recent history of the West Coast. The loss of forest potential is incalculable; now collective action is necessary to bring about sustainable management (see Baines *et al.* 1988 for a discussion of this approach).

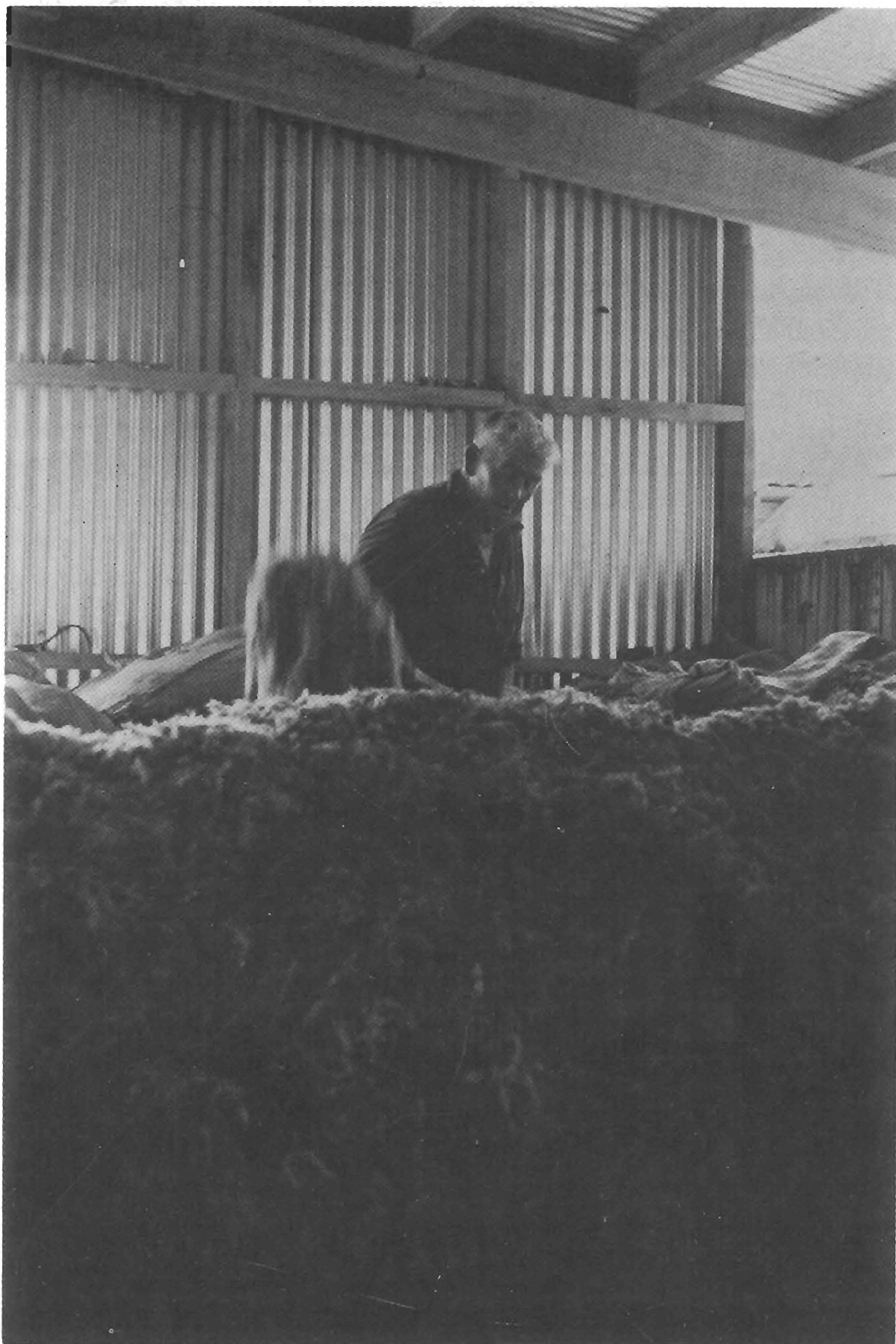
The creation of the West Coast Sphagnum Moss Industry Association, a voluntary body of those in the industry, was an attempt to foster a close working relationship between harvesters and State agencies. But membership of the Association has dwindled, after allegations of favouritism in the awarding of licences and an alleged failure by NZFS to honour an agreement to issue moss licences to members only. Solidarity was sacrificed in the face of strong buyer leverage, and individual producers have been 'played-off' against one another and pressured to reduce prices. This was particularly evident in the 1990-91 season, and is partly the reason behind the formation in 1993 of a new producer body, the Quality Moss Packers' Association. The intention is to improve communications, trust and cohesion in the industry. Whilst it is too soon to speculate how successful this will be, hopefully, it is a recognition that cooperation is better than conflict.

Equity: returns to private producers and to the public

The Pakeha period of West Coast history has been marked by a transfer of control from individuals to corporate interests, the scramble for riches and the devastation of many lowland natural environments north of the Cook River. The forestry industry is a case in point: over the years it became vertically integrated and controlled by non-Coast corporate enterprises, who were allocated unsustainable cutting rights by the State (Tilling 1989, 1992a).

This is not to say that local individuals were or are paragons of virtue. Evidence from many parts of the world suggests, however, that local control over local resources can engender a strong sense of responsibility and commitment to resource conservation, especially when the long-term viability of communities depends on this. It follows that the benefits of development must not be disproportionately appropriated by the rich and powerful. However, these maxims are complicated by a consideration of local versus regional and national interests.

On the West Coast, the locals want their fair share of sphagnum moss: the proverbial "golden egg". But, the golden egg is



Sorting sphagnum moss – West Coast. Photo: A.J. Tilling.

predominantly controlled by the State. The only access local people have to the resource (apart from the few freeholders) is by obtaining harvesting rights, establishing processing facilities (which is usually predetermined by harvesting rights) or by illegal means. So, not surprisingly, locals have been concerned about access to moss and rights to harvest it.

In this light, Timberland's operations might be viewed as unfair and unsatisfactory by some local operators, although it is now far more equitable than the system it replaced (since profits and losses accrue to all the citizens of New Zealand from the new sole venture operated by Timberlands). This may be of insufficient benefit to engender local respect for Timberland's resource policies as few individual moss harvesters can get access to this resource for their own private gain, when many know that moss has been a highly lucrative non-timber, forest-based industry.

Under DOC's system, local harvesters can have access to the resource if they have the necessary capital, but because DOC does not process moss, the added value of most of the moss harvested from the DOC estate is realised by a few private processing factories. (This lack of processing by DOC is apparently the result of Government policy to separate conservation from profit generation, which inhibits this agency from acting too commercially [Tilling 1989].)

There is no easy solution to the conundrum of local versus regional/national interest as the State controls most of the moss resource, supposedly held in trust for future generations. On the one hand, the allocation of moss harvesting licences must be seen to be fair and equitable and not just favour the few large-scale private processors. There would be more public benefit in DOC doing its own processing or, alternatively, in ensuring that moss harvested from its estate was processed by Timberlands. But, on the other hand, there will always be individuals or private companies who want to make large financial returns and who will be discontented with having to share the rewards accruing from a public resource.

CONCLUSION

The sphagnum moss industry is an example of a non-timber forest and peri-forest product which has grown in importance to rival a traditional forestry activity. The road to this apparent success has not always been simple and straightforward as, like many non-wood forest products, it was viewed as a "minor" forest product and was given low priority by the NZFS and other government agencies.

However, the history of the moss industry demonstrates that official attitudes can change when there are clear economic and social benefits for doing so. In many respects, the West Coast is fortunate that a great deal of sphagnum moss occurs on degraded land and cutover forest where there is not a significant conflict between environmental and development values.

Buoyancy of demand for "wild" crops can have negative consequences too. As opposed to domesticated or farmed crops, it is impossible to boost production per unit area: wider areas have to be exploited (Tilling in press). This is where conflict can arise. In the case of the West Coast and elsewhere, there is a temptation to exploit resources in sensitive environmental areas too, where ecological and other natural values are regarded by the public as paramount. In these localities, economic development of resources may be inappropriate or require very sophisticated management: a condition not always apparent or readily available.

Many careful harvesting efforts are thwarted by the real difficulty of determining the biological characteristics of the resource and by the difficulty of reaching agreement on appropriate harvesting policies and limits. Cooperation and collective action is warranted, together with support from public agencies. Unfortunately, this is often lacking because of ideological reasons, self-interest, lack of resources or indifference. These atti-

tudes can be changed if there are demonstrated mutual benefits for a wide range of people and organisations.

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References

- Baines, J.T., J.C. Wright, C.N. Taylor, K.L. Leathers and C. O'Fallon (1988). The Sustainability of Natural and Physical Resources – Interpreting the Concept. Studies in Resource Management No. 5. Centre for Resource Management, University of Canterbury, and Lincoln College, Christchurch, New Zealand.
- Buxton, R.P., P.N. Johnson and P. Espie (1990). Sphagnum Moss Studies in Westland: Botanical Report. New Zealand Department of Scientific and Industrial Research, Christchurch, New Zealand.
- Buxton, R.P., P. Espie and P.N. Johnson. 1991. Sphagnum Moss Studies in Westland: 1990-1991 Botanical Report. New Zealand Department of Scientific and Industrial Research, Christchurch, New Zealand.
- Chamberlain, J. personal communication. NZ Sphagnum Exports Ltd. Dec. 1993.
- Craig, M. 1986. South Westland Sawmill Register 1865-1985. New Zealand Forest Service, Hokitika.
- Denne, T. 1982. Sphagnum on the West Coast, South Island: Resource Characteristics, the Industry and Land Use Potential. Unpublished M.Sc. Thesis, University of Canterbury, Christchurch, New Zealand.
- Department of Conservation n.d. Guidelines for Sphagnum Moss Harvesting. Department of Conservation, West Coast Conservancy, Hokitika.
- Sinclair, B. 1985. The West Coast Timber Industry, 1866-1914. New Zealand Forest Service, Hokitika.
- Tilling, A.J. (In press). Realising the potential of non-timber forest products: the predicament of West Coast indigenous forest-based users in the South Island, New Zealand. *Journal of World Forest Resource Management*, 7(2).
- Tilling, A.J. 1992a. Indigenous forest Management in New Zealand: From Interventionist to Monetarist Policies and the Special Case of the South Island's West Coast. *New Zealand Forestry*, Vol 37, 4, Feb: 8-13.
- Tilling, A.J. 1992b. Third World Meets First World in the West Coast Region of the South Island, New Zealand: Possum Hunting and the Role of Social Forestry in Indigenous Forest Management. *New Zealand Geographer*, Vol 48, 2, October: 65-70.
- Tilling, A.J. 1989. Alternative Use of West Coast Indigenous Forests. Unpublished Ph.D. Thesis, School of Forestry, University of Canterbury, Christchurch, New Zealand.
- Tilling, A.J. 1988. Multiple-use Indigenous Forestry on the West Coast of the South Island, New Zealand. *New Zealand Forestry*, Vol 32, 4, Feb: 13-18.
- United Nations 1992. Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forest. United Nations Conference on Environment and Development, Rio de Janeiro. Final advanced version of the Outcomes of the Conference. New Zealand Ministry of External Relations and Trade, Ministry for the Environment. Wellington, New Zealand.
- The World Commission on Environment and Development 1987. *Our Common Future*. OUP, Oxford.

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