

Women in forestry science

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INTRODUCTION

Women are not new to forestry in New Zealand. They have been employed in the forestry profession since 1925 when Mary Sutherland became the first woman forester in New Zealand, six years after the State Forest Service was established. The first woman began the professional training for a Bachelor of Forestry Science (B.For.Sc.) degree in 1972 at the University of Canterbury. However, forestry has remained a male-dominated domain. The number of women studying and employed in forestry, particularly in senior positions, remains very low.

FORESTRY SCIENCE GRADUATES

The number of women studying in many professional disciplines has increased in recent years with the difference in number between men and women students narrowing. Twenty years ago women made up 19% of all law students at the University of Canterbury; today (1993) women account for 55% of the law students. Women studying commerce and science now account for 34% of the students at this university. At the Christchurch Clinical School 46% of the medical students are women. The two disciplines which seem to lag behind, and remain dominated by men, are engineering (12%) and forestry (16%) (University of Canterbury, August 1993).

Early women in forestry

Mary Sutherland was not only the first woman forester in New Zealand, but the first in the British Empire and possibly the world (Lynch 1991). She emigrated from Britain in her early thirties after obtaining a science degree in forestry at the University Col-

lege of North Wales, served in the Women's Land Army during World War I, worked as a forester on two Scottish estates, and as assistant experimental officer with the British Forestry Commission. Despite initial resistance to the employment of a woman, she was given a permanent appointment by the State Forest Service on investigative work in silviculture in 1925, and was later seconded to the new position of Farm Forestry Officer with the Department of Agriculture (Lynch 1991). Mary Sutherland was among the charter members of the New Zealand Institute of Forestry in 1927, became a Councillor in 1935, and Vice-President in 1940-41. She is remembered with an award in her name which is given annually to the highest-achieving New Zealand Certificate of Forestry student at the Forestry Training Centre, Rotorua.

Women studying forestry, New Zealand Universities

Women have only gradually looked to forestry as a career. No women studied at the original schools of forestry at Auckland (1924-30) and Canterbury (1924-34) University Colleges (A.P. Thomson, pers. comm.). Although dozens of men were sent overseas by the New Zealand Forest Service to train as foresters between 1945 and 1968 (the last students returned at the end of 1970) no women were sent. The present School of Forestry, University of Canterbury started admitting students in 1970, and the first woman to enter the school (Heather McKenzie), in its third intake year, graduated in 1974. A total of 44 women have graduated from the School of Forestry with a B.For.Sc. degree (Figure 1). This equates to 8.6% of the total graduates, or a mere two women per year. The peak year for women was the 1987 graduation year with six women graduating (21.4%). The numbers of women graduating have declined from four (15.4%) in 1990, to only one annually in the period 1991-93 (6.3%).

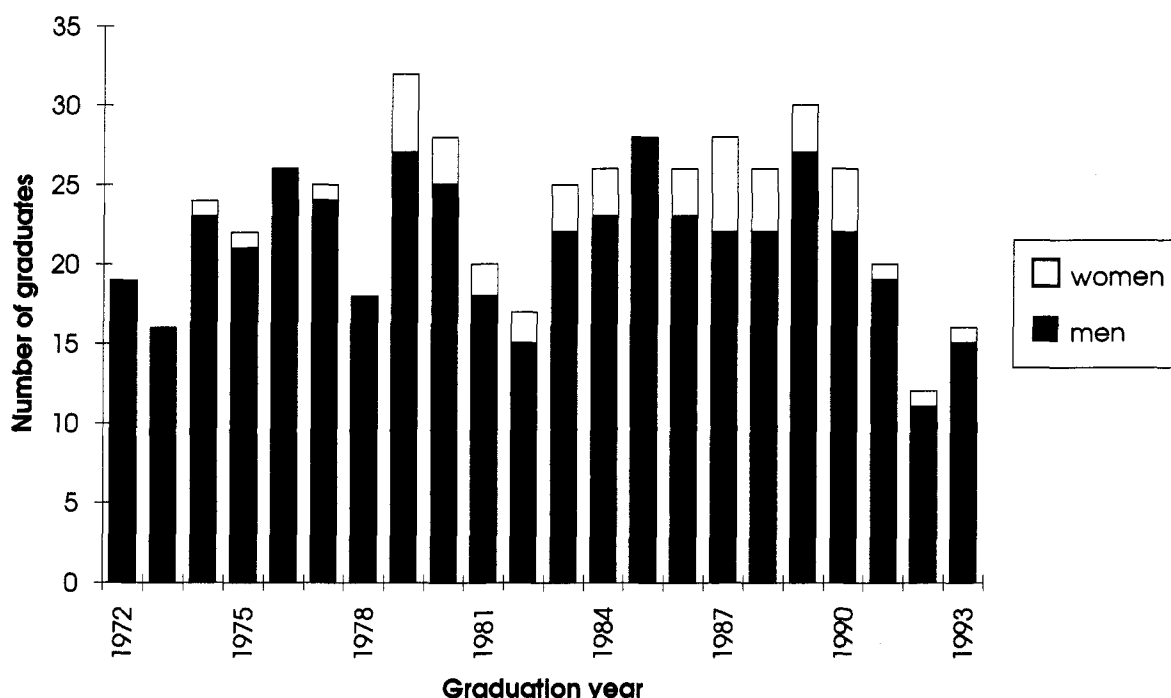


Figure 1: Number of B.For.Sc. graduates from the School of Forestry, University of Canterbury, 1972-1993.

Although there is only one woman majoring in forestry (5.9%), and three women (11.1%) are currently taking a Stage 2 paper on Forests and forestry for the B.Sc. (Tech) degree at the University of Waikato, 11 women took this paper in both 1992 (42.3%) and 1991 (27.5%) respectively. At Lincoln University six women (9.4%) are currently studying for an undergraduate diploma paper on Forestry and Shelter, and a Stage 2 paper on Trees in the Rural Environment attracts 20 women (48.8%). About 28% of the University of Canterbury fourth-year undergraduate students in forestry are women (Table 1), although this represents only five women students. However, in addition to the students enrolled in the B.For.Sc. degree an additional eight women (17%) are studying silviculture and five (25%) agroforestry for Lincoln University degrees. Also a new Stage 1 paper on Forests and Societies, which is open to all University of Canterbury students, has attracted an average of 51 women per year (31.1%) since it commenced in 1990.

A new degree, B.E. (For), which is offered by the Engineering Department, University of Canterbury only has one woman student in the second professional year (25%), no women in the first and third professional years (15 students), and no women graduates.

Table 1: Number of women and men studying for a B.For.Sc. at the School of Forestry, University of Canterbury, 1993.

Year of Study	Women	Men	Total No. (Women and Men)	Women (% of Total No.)
1	10	67	77	13.0
2	5	43	48	10.4
3	5	28	33	15.2
4	5	13	18	27.8
Total	25	151	176	14.2

Source: School of Forestry, University of Canterbury

Post-graduate forestry degrees were taken at overseas Universities by some men pre-1970. The first man to obtain a post-graduate forestry degree (Masters) in New Zealand did so in 1973 (the first year a purely New Zealand trained forestry graduate could obtain a postgraduate degree), but it was 1985 before the first woman received a Masters. The number of women who have graduated with a Masters or Ph.D. in Forestry Science has been low, with only one woman Ph.D. (graduated 1989) and seven women Masters graduates (12.1%) (Table 2). However, the number of women currently enrolled as Masters students has risen to four (18.2%) and another woman has enrolled for a Ph.D. One woman is now enrolled in the Diploma course.

Table 2: Number of women and men awarded and currently studying for postgraduate degrees from the School of Forestry, University of Canterbury, 1972-93.

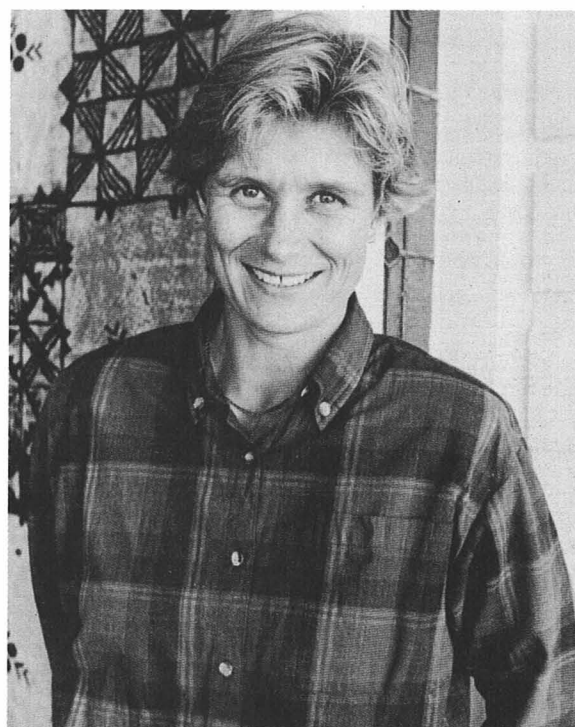
Degree	Year	Number of Graduates			% Women
		Women	Men	Total (Women & Men)	
Diploma	1972-92	0	10	10	0
	1993	1	7	8	12.5
Masters	1972-92	7	48	55	12.7
	1993	4	18	22	18.2
Ph.D.	1972-92	1	19	20	5.0
	1993	1	11	12	8.3
Total	1972-92	8	77	85	9.4
	1993	6	36	42	14.3

Source: School of Forestry, University of Canterbury

Employment of women foresters

Although no official statistics are kept, the authors have been able to trace 39 of the 44 graduates of the School of Forestry, University of Canterbury. Twenty-eight women (71.8% of the sample or 63.6% of all women graduates) in the 23-year history of

the School of Forestry are employed in forestry or related professions, two are furthering their studies, three are employed in other professions, six are not in paid employment, and the whereabouts of the other five are unknown. The women graduates are employed in a wide and diverse range of fields from research scientists (NZ Forest Research Institute) to foresters (Ministry of Forestry, Forestry Corporation, Carter Holt Harvey Forests, Tasman Forestry, British Forestry Commission), a forestry and environmental advisor (Ministry of Foreign Affairs and Trade), conservation officers (Department of Conservation), and private company consultants in New Zealand and overseas. One notable exception, however, is teaching; no women are employed as lecturers in forestry at New Zealand Universities or Polytechnics. The equivalent statistics are not available to make comparisons with male counterparts.



Ket Bradshaw was the third woman to graduate with a Bachelor of Forestry Science from Canterbury University in 1977. She was recently profiled in the Ministry of Forestry's publication "Women in Forestry".

Women and the NZ Institute of Forestry

Last year there were more women on the Institute of Forestry Council than there have been before – there were two women Councillors and a woman Treasurer (who is trained as both forester and accountant). However, women only represent 3.9% of the members (24 women).

WOMEN EMPLOYED IN FORESTRY RESEARCH

Although there are other organisations which carry out research in the field of forestry, the New Zealand Forest Research Institute Limited in Rotorua (NZFRI) carries out the bulk of this research. Women graduates from a range of science disciplines fill science positions at NZFRI.

The number of women scientists at NZFRI has always been low. Although the percentage of women scientists has risen marginally since 1975, the proportion is still low (17% in February 1993) (Table 3). These figures are, however, similar to national figures on the proportion of women engaged in research and development in all sectors in 1990/91 (MORST 1991). This

report estimated that 17.3% of all researchers and 29.4% of all technicians engaged in research and development were women.

Women were initially employed at NZFRI mainly as laboratory rather than field technicians. This is shown in Table 3, with the higher percentage of women technicians in the Forest Sciences and Forest Products Divisions (mainly laboratory work) compared with the Protection and Forest Management Divisions (mainly field crews).

Table 3: Women scientists and technicians in NZ FRI Science Divisions, 1976, 1980, 1985, 1990, 1993

Year		SCIENTISTS ¹		TECHNICIANS ¹	
		Women % of Total No.	Total No. (Women and Men)	Women % of Total No.	Total No. (Women and Men)
1976 ²	Production Forestry Division				
	Forest Management	3	(31)	5	(65)
	Forest Sciences	17	(30)	40	(40)
	Forest Products Division	0	(29)	31	(36)
	Protection Forestry Division	0	(27)	14	(28)
	TOTALS	5	(117)	21	(169)
1980 ³	Production Forestry Division				
	Forest Management	3	(34)	2	(60)
	Forest Sciences	17	(30)	30	(40)
	Forest Products Division	0	(29)	37	(27)
	Protection Forestry Division	4	(25)	10	(31)
	TOTALS	6	(118)	18	(158)
1985 ⁴	Forest Health & Improvement	15	(39)	13	(61)
	Forest Management & Resources	14	(43)	26	(47)
	Wood Technology	0	(32)	16	(37)
	Protection Forestry	0	(29)	20	(30)
	TOTALS	8	(143)	21	(175)
1990 ⁵	Forest Health & Improvement	19	(21)	27	(30)
	Forest Management & Resources	11	(38)	28	(32)
	Wood Technology	11	(35)	26	(27)
	PAPRO	10	(10)	46	(13)
	Forest & Wildland Ecosystems ⁷	7	(42)	15	(34)
	TOTALS	11	(146)	26	(136)
1993 ⁶	Forest Technology	17	(47)	26	(41)
	Biotechnology	17	(12)	39	(28)
	Wood Products & Processing	15	(34)	18	(33)
	PAPRO	21	(19)	54	(22)
	LIRO	0	4	0	3
	TOTALS	17	(112)	31	(124)

¹ Includes full and part-time employees

² As at 31 March 1976

³ As at 30 September 1980

⁴ As at 31 March 1985

⁵ As at 1 September 1990

⁶ As at 1 February 1993

⁷ Includes women employed as editor and librarian, i.e. only 2.4% women scientists in research

Source: NZ FRI staff by designation lists, payroll section.

Within the science divisions, the proportion of women technicians has been higher in a few individual research fields – Propagation and Early Growth, Soils, Wood Materials, and more recently, Pulp and Paper Research Organisation (PAPRO) and Mensuration. The reasons for this are unclear, but in some cases can be attributed to the traditional perception that laboratory work was considered suitable for women. It may also be attributed to the concept that the presence of women has attracted other women to their research areas. There has, for example, been a recent increase in the number of women in the Mensuration group, a traditionally “male” research area.

Women in science management

Women have never played a prominent role in science management at NZFRI. Although in the past there have been women employed in “executive” management (science managers and above) roles, extremely few women have been promoted “through the ranks” to have direct management of research fields. One woman was the manager of a research cooperative. Although two women have recently been appointed to research management positions in the area of Molecular Biology, the June 1993 figures show that women currently dominate the “support” occupations: science and management assistance, science support, clerical, word processing and reception (Table 4).

At NZFRI, there are differences in the level of qualifications held by gender, with 64% of men with university qualifications having a postgraduate degree, compared to only 25% of women. Women have also not received the same level of support for

Table 4: NZ FRI Ltd. - Number of employees by occupational class and gender as at 30 June 1993.

Occupational Class	Men (No) ¹	Women (No) ¹	Women (% of Total No)
Executive Management	12	0	0
Research Management	18	0	0
Management Support	10	1	9
Scientists ²	85	19	18
Technicians	85	47	37
Science Support (Technical)	8	12	60
Science & Management Assistance	0	6	100
Clerical	4	12	75
Word Processing/Receptionists	0	13	100
Trades	8	0	0
Unskilled ³	7	1	13

¹ Includes full and part-time employees.

² Excluding research management.

³ Excludes wage workers and contract workers.

Source: NZ FRI Payroll Data

Ph.D. training as men in the organisation, with 43% of all employees with Ph.D. training (exclusively men) having been supported by the organisation. The first woman to be supported in Ph.D. training has recently commenced her studies in Great Britain.

Women's contributions to forestry research

Despite the scarcity of women scientists, and their absence from management roles, there are a number of women who have made and are making significant contributions in various fields of forestry research.

It is difficult to ascertain who was the first woman scientist at NZFRI, because many of the old personal records were lost during the period of Public Service restructuring. However, it is believed that Joy Osborne (Ross), a mycologist, was transferred from the NZ Forest Service Wellington to FRI Rotorua during the period 1947/48. Some of the other known earlier FRI scientists during the 1950s were Margaret Lancaster (Orman), a botanist, Joy Giblin (McKelvey), a wood anatomist, Cath Bibby (Pullar), a botanist, Nancy Wilson (Bell), an entomologist, and Margaret Wilson, a wood properties specialist.

Another prominent woman in forestry research was Mavis Davidson (Gedye) who obtained a B.Sc. in 1947 and M.Sc. in 1950 (Chavasse 1991). She was appointed as biologist by the New Zealand Forest Service in 1958. Her principal interest, the study of deer, especially sika, became her main topic of research with major studies from 1963 to 1974. Mavis Davidson has a long list of publications and continues to write in her “retirement” (Chavasse 1991). As a notable member of the New Zealand Institute of Forestry since 1963, Mavis Davidson has been honoured by being appointed as a Fellow of the Institute.

Today, the number of women scientists and their range of activities have increased to cover nearly all fields of forestry research. The following are four random profiles of women scientists currently employed at NZFRI, in different areas of research and with different levels of experience:

Ruth Gadgil (Ph.D.) is the most senior woman scientist at NZ FRI, having been employed there since 1966 (part-time since 1970). She was compulsorily retired in 1989, but was re-employed on contract. She is internationally recognised in her field, having led the research teams investigating the importance of nitrogen-fixing plants in radiata pine forests and the replacement of lupin with more desirable understorey plants. Ruth's current research programme involves the revegetation of North Island sand dunes, using nitrogen-fixing species to replace the lupins which died in the 1980s as the result of an introduced blight. One of the most satisfying events in her long research career involved joint work in the 1970s with her husband, a forest pathologist, on the effects of radiata pine mycorrhiza on forest floor decomposition. In the course of this work, they discovered that the cause of lupin death (the lupins are the tree's

source of nitrogen) in Poutu Forest in Northland was a Molybdenum deficiency. This discovery enabled the forest, which was situated in an economically depressed area, to continue to be a viable enterprise, providing the opportunity for direct and indirect employment in the area.

In a very different field, Alison Slade is employed at NZFRI as an environmental scientist, specialising in the modelling of waste treatment systems at kraft pulpmills. She graduated with a B.Tech. Biotech. (Hons) in 1988 and has been employed at NZFRI since graduation. Alison's major projects at NZFRI have been in the areas of hydraulic and biological modelling of waste treatment systems. One of the high points of Alison's career was the successful production of an hydraulic model for the Tasman Pulp and Paper plant at Kawerau. Another high point was in winning an award for the best technical paper at the TAPPI Environmental Conference, 1991 in San Antonio, Texas, in the Water category.

Marian Woodall works in the unusual area of developing methods and techniques for analysis of printing paper. She obtained a B.Sc. (Hons) in paper science at Manchester University's Institute of Science and Technology followed by a research assistantship at the university for eight months. In 1986 Marian was appointed to the Pulp and Paper Research Organisation (PAPRO) based at NZFRI to establish a research programme in the field of printing. Much of her work involves relating inks to the paper structure and wood fibres and this involves using techniques such as microscopy. Marian uses many paper samples from overseas for comparative purposes and is constantly seeking new sources of paper in her many trips overseas. In June this year Marian returned from a 10-month secondment to the Norwegian Pulp and Paper Research Institute (PRI) in Oslo, replacing a woman on 10 months fully paid maternity leave.

Sue Carson obtained her Ph.D. in forestry from North Carolina State University and has had a varied career working as a plant pathologist, a geneticist and latterly in the area of molecular biology. Her first job as a researcher was with the US Forest Service where she was Manager of the Resistance Screening Centre in Ashville, North Carolina. Twelve years later a rust resistance screening process, developed by Sue, is still being used. She worked at NZFRI from 1982-86 in the Genetics and Tree Improvement research field, followed by two years as a research cooperative manager. Sue then returned to work in the growth and yield area, quantifying the amount of increased wood which will result from using the genetically improved breeds of radiata pine. She is now managing the gene mapping and early selection programme at NZ FRI. Her advice to young women pursuing careers in science is to follow their own interests, mindful of her father's own advice when she was embarking on her own career that "the job you will do has not even been invented yet".

CONCLUSION

Women have been employed in forestry since 1925 and have trained in forestry science since 1972. However, only 44 women have graduated from the University of Canterbury with a B.For.Sc. degree (8.6%, or two per year). The figures may now be improving with forestry offered at the University of Waikato and Lincoln University and as a general science option at the University of Canterbury. A high proportion (68.2%) of the women B.For.Sc. graduates are employed or are studying in a range of forestry or related professions.

Women make up 17% of scientist and 31% of technician staff at the NZ Forest Research Institute. However, women technicians are concentrated in a few research fields which traditionally had a high component of laboratory work. Currently there are few women employed in management roles. The occurrence of post-

graduate degrees is considerably scarcer amongst the women scientists and technicians than amongst their male counterparts.

The few women in forestry have made a significant contribution to the forestry profession. Perhaps more women will see forestry as a suitable career if more women are employed in senior positions, the success of women role models is better publicised, and the forestry training institutions have a more equitable gender balance.

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Natural regeneration



Douglas fir natural regeneration, Naseby Forest, Otago, 1990. Photo © J.H.G. Johns.