International comparison of occupational injuries among commercial fishers of selected northern countries and regions

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Photos NIOSH/ Alaska Field Station

Purse seining in Sitka Sound

Introduction

Commercial fishing represents the oldest and one of the most important economies in countries with northern fishing grounds, along with a high occupational safety and health risk for those involved in it. Indicators of this risk were surveyed and analysed in earlier studies in Alaska and northern countries. [3-13] Fishing-related occupational fatalities in Alaska always were higher due to specific, and rapidly changing weather conditions, the far and isolated fishing grounds, and many other circumstances. Earlier studies observed a fatality rate of 414.6 per 100,000 workers for Alaskan fishermen in 1980–84. [3] As a result of prevention-oriented regulations and interagency safety collaboration, rates have dropped significantly from 200/100,000/year for 1991–1992 [1] compared to 116/100,000/year from 1991–1998 [2]. High rates of fatal traumatic injuries have been observed among commercial fishermen of other countries too. (Norway 1961–75: 150/100,000 [13]; Sweden 1975–86: 110/100,000 [11]; Denmark 1989–96: 140/100,000 [12]; Iceland 1966–86: 89/100,000 [8]) Our study has focused on international comparison of the recent occupational safety and health status during the 1990s and fishing safety activities in countries with northern fishing grounds, including Canada, Denmark, the Faroe Islands, Greenland, Iceland, Ireland, Norway, Sweden, Russia, the United Kingdom and the USA.

Methods

Data on fishing vessel casualties and fishing-related occupational injuries and fatalities from Alaskan, US, international and other national data sources were collected, compared and analysed for the 1990s. This included different variables, such as frequencies and fatality rates, death causes and circumstances, nature, type and causes of casualties. Alaskan data were derived from the Alaska Occupational Injury Surveillance System (AOISS), which is maintained by the NIOSH/Division of Safety Research/ Alaska Field Station. Access to information of such type in other countries is somewhat limited. Statistical information, reports and descriptions were obtained from appropriate foreign agencies: the Search & Rescue Branch of the Canadian Coast Guard; the Transportation Safety Board of Canada, the Icelandic Maritime Authority, the UK Marine Accident Investigation Branch (MAIB), the Health and Safety Authority of Ireland, the Maritime Authorities (Denmark, Sweden) and fisheries safety research institutions of Scandinavian countries (Sintef/Marintek in Norway) and Russia (Kaliningrad State University). Fishing death rates were obtained either from existing country reports for comparison or were calculated based on the number of registered fishermen. Circumstances and major causes of fishing casualties and fatalities were also compared and analysed as available data permitted. In addition, fishing vessel safety materials, policy reports and relevant regulations were studied to identify the countries' capability and preparedness to prevent injuries and fatalities in the commercial fishing industry.

Results

Occupational safety and health records concerning the fishing industry and fishermen's injuries and fatalities vary from country to country. The main results are summarized as follows:

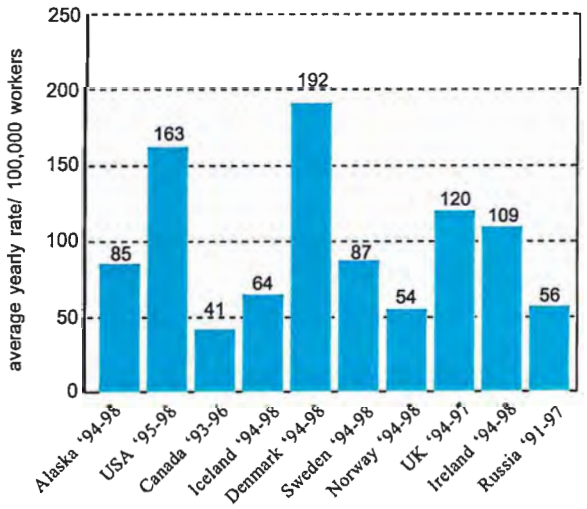
1. National and international data show fishing as one of the most dangerous jobs in most countries based on vari-

ous sources of fatality frequencies among fishermen. [14–22] *(Table 1)*

2. Fishing-related fatal occupational injury rates range from 41 per 100,000 [23] to 192 per 100,000 [24] between 1994–98 in countries with northern fishing grounds. *(Graph 1)* About half of the countries, analysed for 1994–98 had rates higher than the world average: 80/100,000 estimated by the ILO [25]. During the 1990s, fishing fatality rates were substantially higher compared to the national average occupational fatality rates in all observed nations. *(Graph 2)*
3. Foundering, capsizings, and grounding were the 3 most frequent, leading risk factors for fishermen's deaths according to international casualty statistics for 17 countries, including in part northern ones as well. [26]
4. Eighty percent of vessel-related fatalities were associated with medium size and small vessels under 24m/80ft due to capsizing and foundering. [26] *(Graph 3)* Fatal incidents are more likely to have involved small vessels in every country. For example, analysis found that about 80% of fatal occupational injuries among British fishers in 1992–97 [21], 80% in Canada in 1993–98 [27], and 50% in Iceland in 1993–98 [28] occurred on vessels under 24m/80ft.
5. Casualty indicators taken by selected countries demonstrate that vessel-related causes are the predominant causes of occupational fatalities in more than or around half of the cases in many countries. Of the vessel-related events, capsizing is usually the leading cause for fishermen's death. Non-vessel related causes are dominated by man-over-board events according to various casualty sources [29,28,22,24,19] from the analysed countries. *(Table 2)*
6. Some fishing technologies, especially crabbing, lobster fishing, are the most dangerous types of fishing, responsible for about 18% [30] to 40% [2] of fatalities.
7. Drowning, presumed drowned and hypothermia are the predominant death causes for fishers (e.g. 91% in Canada [27], 88% in Alaska [2], and 78% in Ireland [22]).
8. Human factors have a substantial impact on the occurrence and outcome of casualties and injuries (e.g. Nordic countries: ~46% [31]; USA: ~80% [32]).
9. Limitations exist for cross-country data comparison due to differences in casualty and injury reporting systems and definitions

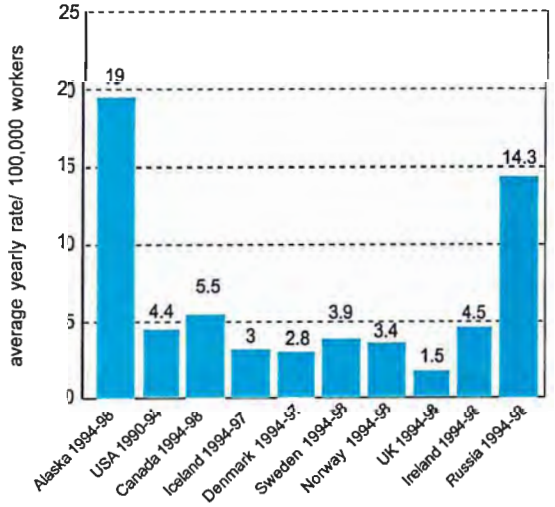
Discussion

Our ability to make meaningful international comparison of occupational injury statistics is limited, because of the differences in national guidelines, registration and surveillance standards, in the ways countries collect information, the use of definitions, the coding practice,



Sources:
1. Alaska: CDC/NIOSH/DSR/Alaska Field Station: AOISS database for numerators (n = 17,400 FTE fishers)
2. United States: US Coast Guard data (Spitzer: Fishing Vessel Casualty Task Force Report 1999). For 1994: n/a
3. Canada: ILO Statictical Yearbook 1998 (fishing inlcudes the whole sector as defined by ISIC 3). Data N/A for 1994–98.
4. Iceland: Icelandic Marine Accident Investigation Committee and Maritime Administration for numerators; Statistics Iceland and
the Icelandic Maritime Administration for denominators (full time and part time fishers)
5. Denmark: Institute of Maritime Medicine and the Danish Maritime Administration for rates including Greenland and the Faroe Islands (full-time and part time fishers).
6. Sweden: The Swedish Maritime Administration (numerators and denominators).
7. Norway: MARINTEK/SINTEF – The Norwegian Marine Technology Research Institute, Division of Fisheries and Aquaculture, Trondheim, Norway for numerators and Statistics Norway for full-time and part-time fishermen.
United Kingdom: UK Dept. of Transport, Marine Accident Investigation Board (MAIB) for numerators and MAFF (registered total fishermen). For 1998: n/a
9. Ireland: Health and Safety Authority for numerators; Central Statistics Office for the number of total fishermen
10. Russia: Kaliningrad State Technical University, Fisheries Safety Research Project (separate data N/A for 1994–98)

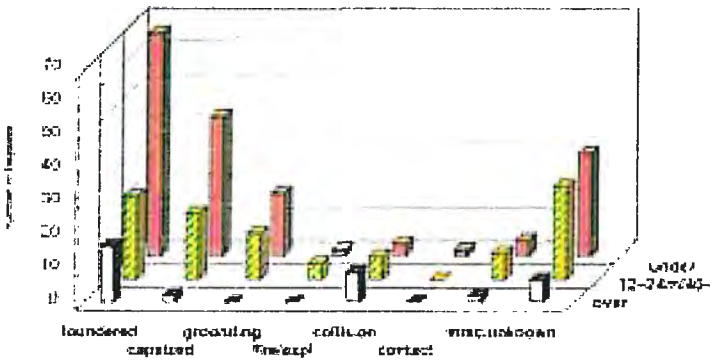
Graph 1. Occupational fatality rates in the fishing industry
Рис. 1. Индекс производственной смертности в промышленном рыболовстве



Sources:
Alaska: State of Alaska Epid. Bulletin N8/1999, USA: CFOI 1994
Canada: Human Resources Development, Canada, Labor Branch, OS&H and Fire Prevention Division, Occup. Inj. Stats. 2000
Iceland: ILO Statistical Yearbook 1998 (occup. injuries and fatalities) and Statistical Yearbook of Iceland 1999 (labor force); 1998:n/a
Denmark: Danish National Occupational Injury Registry + various sources for the number of labor force. 1998: n/a
Sweden: ILO Statistical Yearbook of 1998 for 1994-96; The Swedish Natinal Board of Occupational Safety and Health for 1997-98
Norway: Statistical Yearbook of Norway 1997 - 1998 - 1999 (industrial fatalities and employed persons)
United Kingdom: UK Health and Safety Commission & Executive: Revitalising Health & Safety, Consultation Document, July 1999
Ireland: Health and Safety Authority, Annual reports 1997-99 (fatalities); Central Statistical Office, Labor Force Survey 199
Russia: Ministry of Labor and Social Development, Dept. of Occupational Safety and Health, Annual Report 1999

Graph 2. Occupational fatality rates in selected countries vs. the US and Alaska
Рис. 2. Сравнение индексов производственной смертности в промышленном рыболовстве исследованных стран в сопоставлении с Аляской и США

Lives lost due to total fishing vessel losses by nature of casualty and vessel length in 17 fishing countries, 1994–97



Source: International Maritime Organization, London, UK: Casualty Statistics and Investigations FSI/7/6/2 Jan 1999
Source includes 6 countries with fishing grounds at northern seas, such as Canada, Denmark, Iceland, Norway, Sweden, United Kingdom, but no separate breakdown available for these countries by primary nature of casualties.
Other countries: Brazil, Cuba, Germany, France, Hong Kong, Morocco, Netherlands, Slovenia, Spain, Poland, Vanuatu

Graph 3. Risk factors in fishing
Рис. 3. Факторы риска в рыболовстве: по вертикали – число смертельных случаев, по горизонтали – причины аварий судов (затопление-опрокидывание-посадка на мель-пожар-столкновение-бортование-невыясненные), по поперечной оси – длина судов (более 24 м – 12-24 м – менее 12 м). Учтены статистические данные по 17 странам за 1994–97 г.г.

and many other factors. The number of reported fatalities varies from country to country depending on the size of the population and the work force involved in fishing. This study attempted to reconcile numerator data derived from different sources, because more often country statistics on the number of fishing deaths included not only fishing operations and technologies, but also other activities with regard to the entire industry as defined in the sector definition as a whole. Some sources included even traffic and leisure time accidents in fishermen's injury statistics. Denominator definitions may also differ within one country: Alaska uses full-time equivalent number of fishers to express the rates. Overall US estimates on the number of fishermen are based on annual average estimates of total number of workers employed in fishing occupations; Sweden provided data for fishermen as they are registered by the Swedish Fishermen's Federation, Norway describes full-time and part-time fishermen in statistical yearbooks, Icelandic data may include both full-time and part-time fishers, Denmark showed full-time and part-time workers, also full-time equivalent indicator for fishers in the 1990s was found. Different approaches by countries in identifying and categorizing occupations in the fishing industry should influence the final rate results, thus comparison and conclusions should be interpreted cautiously. Similar methodological problems in investigating data on traumatic injuries were found in other international studies on comparability of general injury statistics as well, which demonstrates the different experience by countries, and the problem of quality and reliability of international statistics. [33]

Developing fishing vessel safety programmes

By the 1990s, many major fishing countries established their basic regulations for fishing safety. Different government agencies and organizations were assigned to take the primary lead for fishing vessel safety. Fishermen's associations also started to focus on safety and health issues associated with their work. Despite these increasing efforts in prevention, the fishermen's job still represents one of the most dangerous occupations. In recent years interagency actions were activated in response to major casualties and increased fatalities in different countries (e.g. the US Coast Guard Fishing Vessel Casualty Task Force of 1999 [34], the UK Safe Fishing Campaign 1998 [35], development of a joint casualty database (the Nordic Dama) by Iceland and Scandinavian countries; operating the United Nations University Fisheries Training Center in Iceland, focusing on fishermen's safety education and coordinating minimum inter-Nordic requirements for safety training [36], introducing compulsory basic safety training for fishermen associated to license certification in Norway [37], monitoring the fishing industry by different government bodies and providing special occupational safety courses, followed by yearly examinations in Russia [25]. On the international level, the ILO Sectoral Activities Program is one of the most important stakeholders for facilitating fishing industry safety in close collaboration with the IMO, FAO, and WHO, who issue different codes and guidelines for the industry. [25] Table 3 gives a brief summary of the most important steps and activities by countries. *(Table 3)*

Table 1. Number of fatal occupational injuries among commercial fishermen in Alaska and by country, 1994–98
Таблица 1. Количество несчастных случаев со смертельным исходом среди рыбаков-промысловиков Аляски и северных стран в 1994–98 г.г.

Year	Alaska	USA	Canada	Iceland	Denmark*	Norway	Sweden	United Kingdom	Ireland
1994	13	75	32	3	19	14		26	1
1995	19	64	17	1	9	7		19	19
1996	25	83	17	9	8	10	4**	20	8
1997	4	62	16	2	8	15	3	29	5
1998	13	73	18	1	7	15	6	26	6
Total	74	357	100	16	51	61	13	120	39
Source:	Alaska Occupational Injury Surveillance System	US Coast Guard	Transportation Safety Board, Marine Occurence Statistics	Inter-sessional Correspondence Group & University of Iceland	Danish Maritime Authority	MARINTEK /SINTEF	Swedish Maritime Administration	Marine Accident Investigation Board	Health & Safety Authority

Note: * Denmark data include the Faroes and Greenland
** 4 cases occurred between 1994–96; no separate data per year available

Table 2. Leading causes and circumstances of fishing fatalities in selected countries in the 1990s
Таблица 2.Основные причины и обстоятельства смертельных случаев в рыболовстве в 90-е годы в ряде исследованных стран

By nature of casualty: (% as a proportion of all vessel-related and non-vessel related causes)
Группы случаев *– связанные с авариями судов и не связанные с авриями; процентная доля группы вычислена по отношению к общему числу несчастных случаев со смертельным исходом*

	USA США	ICELAND Исландия	IRELAND Ирландия	DENMARK Дания	NORWAY Норвегия
Leading vessel-related cause Причины аварии судов	49% capsize/sink Затопление	25% foundering Опрокидывание	33% capsize Затопление	40% capsize Затопление	26% capsize Затопление
Man-over board Падение за борт	25%	33%	20%	30%	27%
Source: Источник;	USCG, 1994–98	Icelandic Marit. Adm. 1996–98	Health & Safety Authority 1994–98	Inst. Marit. Medicine 1990–98	Norw.Marin.Technol. Research Inst. 1990–97

Table 3. Developing fishing vessel safety
Таблица3. Повышение безопасности промышленного рыболовства

Country	Major agencies	Preventive programs, activities
Canada	Canadian Coast Guard Transport Canada Marine Canada Shipping Act; Safety Branch; Workers' Comp. Board	Coordination for safety, annual marine emergency workshops for fishers, Officeof Boating Safety;safetycheck list for small vessels, etc. Regulations: Canada Labor Code, Marine OS&H Regulations; Fishing Vessel Inspection Regulations, etc.
Denmark, Islands, Greenland	Danish Maritime Authority; Fishing Safety Councils; Maritime Authority of the Faroes; Greenland Fisheries Licence Control (GFLC)	Activities for implementation of the Danish Safety at Sea Act and its Techni- Faroe cal Regulations for protection of the crew and working environment, safety courses at fishing schools, etc.
Iceland	Icelandic Maritime Administration; National Lifesaving Association; Ministry & Directorate of Fisheries	Vessel stability projects, Weather and sea state information system; vessel renewal programs, Inter-Nordic fishing vessel safety education program. Regulations: Ship Survey Act of 1993; Icelandic Maritime Administration Act 1996, etc.
Ireland	Health and Safety Authority; Department of the Marine	Fishing vessel safety survey in the 1990s; recommendations for new comprehensive safety regulations and requirements for fishing safety, e.g. mandatory EPIRBs, Programs for improving safety culture, etc
Norway Directorate,	Norwegian Maritime advanced safety course for fishers Tromso Maritime School	Control of seaworthiness, certification for skippers, mandatory basic and
Russia	Federal Inspectorate of Labor; Fishing Fleet Academy	Monitoring safety & health in fishing; safety course during vocational training; regular safety instructions for the crew
Sweden	Swedish Maritime Administration; National Board of Fisheries	Implementation of the Swedish Maritime Code, registration, licensing, safety training; maintains national ("SOS") and international (Nordic Dama) casualty data system, etc.
United Kingdom	Maritime and Coast Guard Agency; Sea Fisheries Inspectorate; MAIB	Safe Fishing Campaign 1998; Developing Code of Safe Practice for smaller vessels; other joint initiatives with the Fishing Industry Safety Group
USA	US Coast Guard	Fishing vessel safety task force of 1999; PTP - Prevention Through People (human factor); Commercial Fishing Industry Vessel Safety Act of 1988

Conclusions

Results from this international comparison of northern countries and regions confirm that fishing-related workplace death is a major occupational safety and health problem in many northern nations. There are similar causes and circumstances responsible for fishermen's occupational traumatic injuries in each country, but close comparison is not always possible because categories may be different for each countries (ie. capsize vs. foundering vs. sinking). Results, however, may indicate the major problem area and should be useful in establishing safety priorities. Industry-oriented inter-agency safety programmes can decrease fishing fatalities (e.g. Alaska [38], Norway [37]). Both national and international fishing safety data require more coordination and improvement in each country. Also there is a need for more international collaboration, detailed data exchange and further in-depth studies to better understand etiology, determinants and prevention of fishing injuries and to learn more from each other's safety experience.

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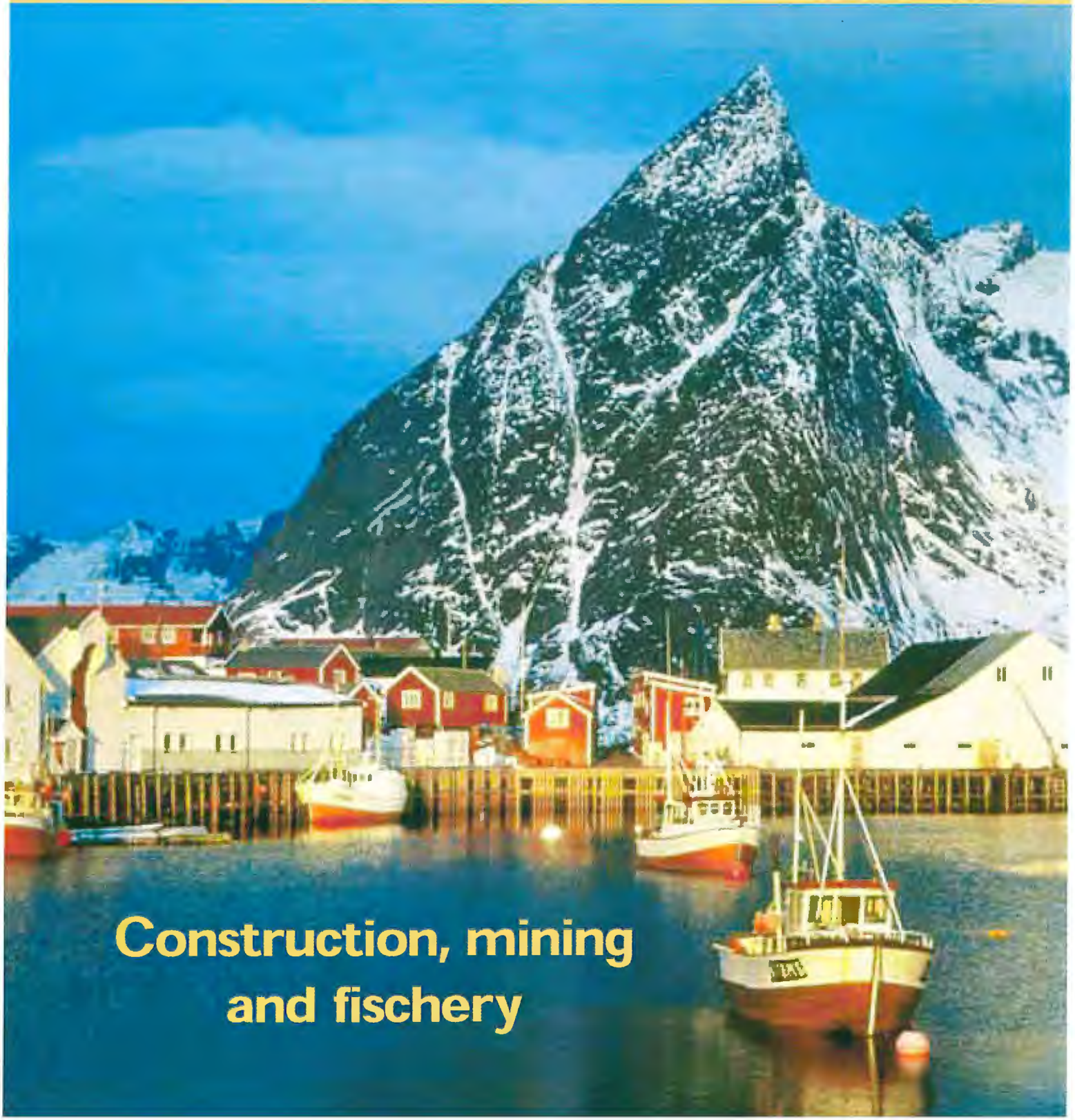

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Contents