Til DN ved Signe Nybø
Fra ; Jordforsk **18 februar 2005**

Vedlegg: Kommentarer til: Vanndirektiv, innfylling av overvåking i Excel skjema.

JOVA - Jord- og vannovervåking i landbruket, et nasjonalt overvåkingsprogram for landbruksdominerte nedbørfelt.

Programmet dokumenterer miljøeffektene av de viktigste driftsformer innen landbruket med et særlig fokus på belastede driftsformer og regioner. Programmet skal sikre et høyt kunnskapsgrunnlag for statlig og regional forvaltning om effekter av landbruksdrift og miljøvennlige driftsformer. Resultatene brukes til nasjonal og internasjonal rapportering av myndighetenes oppfølging av mål og avtaler for landbruket og landbrukspåvirket vannmiljø.

JOVA - programmet har et landsdekkende nett av målestasjoner i små nedbørfelt dominert av jordbruksarealer. Programmet består av to delprosjekt med tilhørende målformuleringer:
· Næringsstoffer og erosjon
· Pesticider

Næringsstoffer og erosjon
JOVA-programmet måler erosjon og tap av næringsstoffer i små nedbørfelt dominert av jordbruksarealer. Det registreres vannføring og analyseres for vannkvalitet i bekkene. Opplysninger om all landbruksaktivitet i nedbørfeltene hentes inn fra bøndene. Hensikten er å dokumentere sammenheng mellom aktiviteten på arealene og tilstanden i vannmiljøet. Områdene er valgt slik at de dekker en variasjon av de viktigste driftsformer i landbruket, klima og jordtyper.

Pesticider
Overvåkingen av pesticider omfatter en rekke forskjellige undersøkelser: bekker og elver, drikkevannsbrønner, overflatenært grunnvann, grøftevann og nedbør er undersøkt i områder der pesticider brukes regelmessig. Formålet med overvåkingen av pesticider er å dokumentere

- forekomst av pesticider i vannmiljø, potensiell risiko for skadeeffekter og trender i utviklingen.
- effekter av myndighetenes godkjenning av pesticider, for å vurdere om de vedtatte bruksbegrensninger for det enkelte pesticid har forventet effekt.
- endringer i landbrukspraksis og effekter på bondens bruk av pesticider.
- framskaffe kunnskap om de viktigste transportveier og forklaringsvariabler i nedbørfeltet som er av betydning for tap av pesticider.
- framskaffe data som kan brukes ved modellering av tap av pesticider fra landbruket og risikovurderinger av landbruksdrift

I noen nedbørfelt er det også supplerende målinger av overflatevann, drensvann (*skiftenivå i Excel skjema*) og avrenning fra skog (*referanse nivå i Excel skjem*) og boligområder.

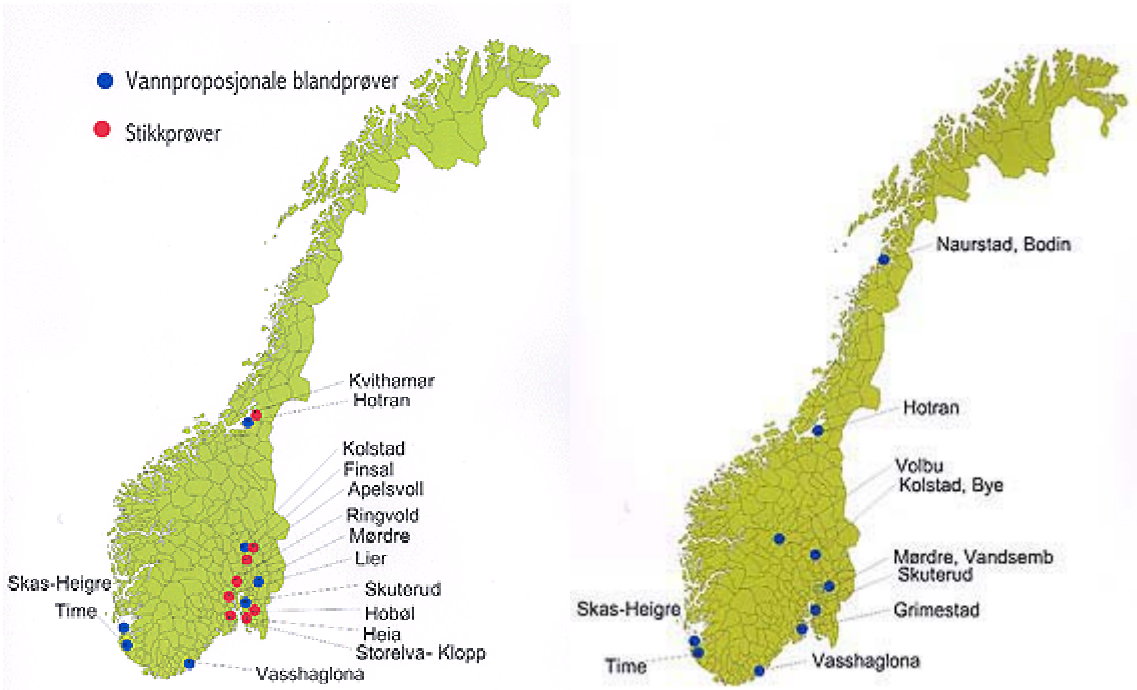
Ansvarlig for JOVA-programmet er Jordforsk i samarbeid med Planteforsk, Rogalandsforskning, NIVA, Fylkesmannens miljø- og landbruksavdeling. Oppdragsgiver er Statens Landbruksforvaltning.

Om grunnvann spesielt

Grunnvann i områder med betydelig menneskelig aktivitet/påvirkning overvåkes bare i beskjeden grad i Norge i dag. Landsomfattende grunnvannsnett (LNG) omfatter i all hovedsak lokaliteter lite utsatt for menneskelig påvirkning. En begrenset grunnvannsovervåking innen landbruksområder foregår innen JOVA-programmet. Jordforsk og NLH-miljøet for øvrig har imidlertid i tidligere og eksisterende forskningsprosjekter for grunnvann instrumentert flere felter i landbruksområder. Dette er felter som også vil kunne være velegnet i overvåkingssammenheng. Ved lokalisering av tiltaksrettet overvåking av grunnvann er det viktig å velge ut lokaliteter egnet for måling av effekter av miljøtiltak.

Aktuelle kontaktpersoner:
Gro Hege Ludvigsen: Program leder for JOVA programmet og faglig ansvarlig for pesticidovervåkingen.
Lillian Øygarden: Forskningssjef, faglig ansvarlig for næringsstoffer og erosjon.
Stine Vandsemb: Ansvarlig for feltoppfølging og årsrapportering
Johannes Deelstra: Ansvarlig for overvåking i Skuterudfeltet med spesielt ansvar for dimensjonering, etablering og drift av målestasjoner.
Jens Kværner: Ansvarlig kontaktperson for grunnvann og vanndirektivet.

Kart med oversikt over målestasjoner i JOVA programmet:



Oversikt over stasjoner med pesticidovervåking til venstre og stasjoner med overvåking av erosjon og næringstoffer til høyre.

EROSION AND NUTRIENT LOSSES

Figure 7 shows the nitrogen (N) losses in 2001/02 and the mean of earlier measurement periods.
N-losses in 2001/02 were lower than the mean values, except for Hotran where the losses were twice as high. This, among other factors, is due to considerable amounts of precipitation and runoff.
Normally, there are large losses of N in autumn after decomposition and mineralisation of plant residues. Large amounts of precipitation in this period will, as in Hotran, generally increase N-losses.
For the Mørdre catchment, dominated by cereal production, the N-losses in 2001/02 were 10 kg N/ha and 40 % less than mean losses. Runoff was about the same as mean runoff. The area sown with catch crops amounted to 40 % of the total agricultural area (Figure 2), which may be one reason for the decrease in N-losses. For the catchments dominated by grass production, N-losses varied between 20-30 kg/ha in 2001/02. The losses did not deviate considerably from the mean values.

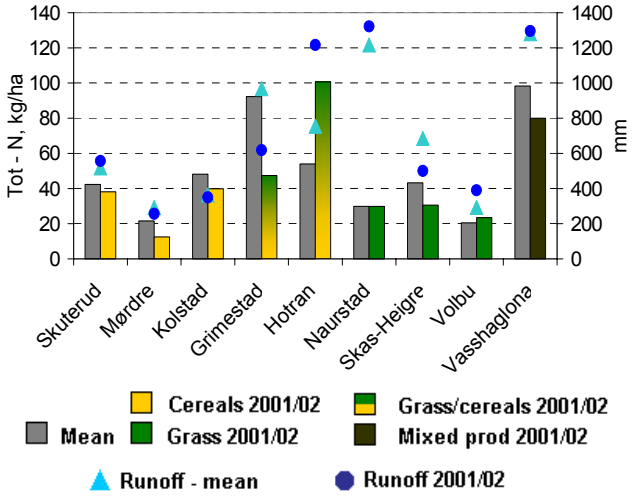


Figure 7. Losses of total N in kg/ha (bars) and mean runoff in mm (dots) from agricultural land from the start of the monitoring period to 2000/01 (mean) and for the year 2001/02.

Figures 8 and 9 show losses of phosphorus (P) and suspended solids/erosion (SS) from the catchments in 2001/02 and the mean of earlier measurement periods. Normal amounts of precipitation in most of the catchments generally resulted in moderate losses in 2001/02.
The losses of SS from Kolstad in 2001/02 were higher than the mean value. More than 60 % of the SS were lost during snowmelt in April. In 2001/02 Hotran had substantial losses of P and SS, most likely due to nearly double the normal amount of precipitation. The soil in Vasshaglona has a high P-content due to the production of vegetables and potatoes.
Losses of P from Vasshaglona in 2001/02 were higher than the mean value. After harvesting vegetables and potatoes, the
soil is vulnerable to erosion, comparable to ploughed areas. In connection with large amounts of precipitation, this may be the reason for the significant P-losses. Stream bank erosion may also contribute to considerable amounts of SS-losses.

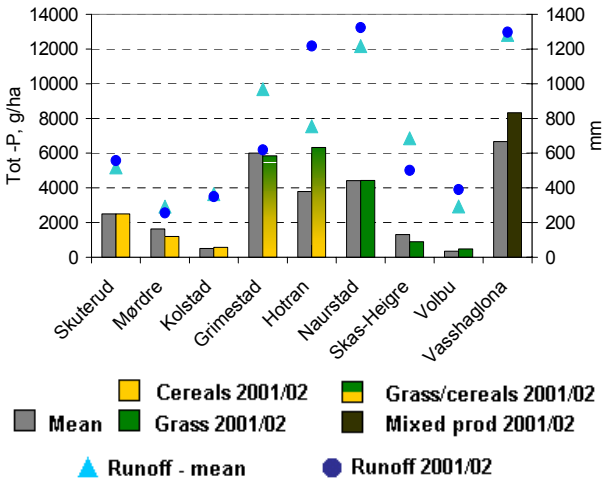


Figure 8. Losses of total P in g/ha (bars) and mean runoff in mm (dots) from agricultural land from the start of the monitoring period to 2000/01 (mean) and for the year 2001/02.

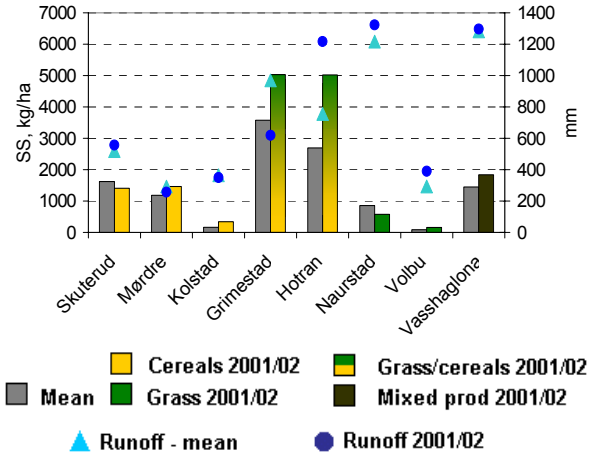


Figure 9. Losses of total SS in kg/ha (bars) and mean runoff in mm (dots) from agricultural land from the start of the monitoring period to 2000/01 (mean) and for the year 2001/02.

Literature: Vandsemb, S.M., R.M. Skjevdal, L.Øygarden, M. Bechmann, H.O. Eggestad, P. Stålnacke og J. Deelstra. Erosion and nutrient losses from agricultural areas. – Results from the Norwegian Agricultural Environmental Programme in 2001/02. (In Norwegian) Jordforsk Report no: 85/02.

On the website you can download reports on monitoring of erosion, nutrients and pesticides from the JOVA pages: http://www.jordforsk.no/fagarealavr/jova.htm.

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Erosion and Nutrient Runoff from Agricultural Land

Results from the Norwegian Agricultural Environmental Programme (JOVA) in 2001/02

The JOVA-programme monitors agriculturally dominated catchments in Norway. These catchments represent farming regions with different climatic conditions, soil types and management practices. The programme's objectives are to document the loss of particles and nutrients from farmland to watercourses, and to relate agricultural measures to long-term changes in water quality. The programme also includes monitoring of pesticides; however, these results are not presented here.

JOVA is a joint effort between the Norwegian Centre for Soil and Environmental Research (Jordforsk), the Norwegian Crop Research Institute (Planteforsk), Rogaland Research, the Norwegian Institute for Water Research (NIVA) and the County Department of Environmental and Agricultural Affairs. The programme is funded by the Norwegian Agricultural Authority.



Map of the catchments in which nutrients and suspended solids in agricultural streams were monitored.1

The monitoring includes ten catchments. Three of the catchments are dominated by cereal production, four by grass production/livestock husbandry. Two of the catchments are characterised by a combination of cereal/grass production (with cereal as the dominating crop) and one catchment of a combination of potatoes, vegetables and cereals.

The JOVA-programme began in 1992. Detailed information on agricultural management practices for each field is collected yearly. The data are well suited for modelling.

Results for agro-hydrological years (01 May – 30 April) are presented here.





Mørdre gauging station in south-east Norway (upper photo) and Naurstad in northern Norway with typical winter conditions (lower photo).

CROP DISTRIBUTION

Detailed data on farm management practices on each single field enable us to analyse the correlation between

measures and losses in the catchments. Figure 1 shows the distribution of different crops in 2001.

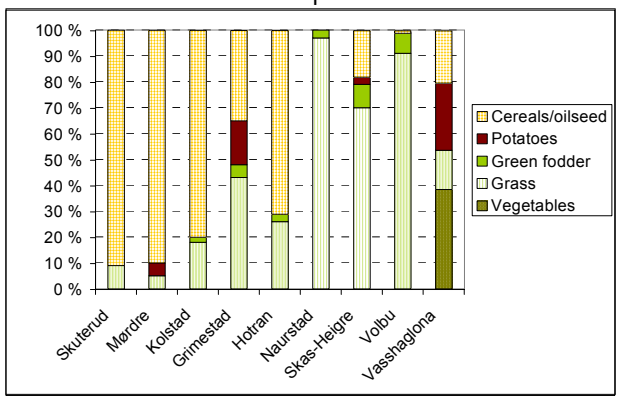


Figure 1. Crop distribution in percent of total agricultural land in the catchments in 2001.

SOIL TILLAGE

Figure 2 shows the crop/tillage status during autumn and winter. The fields' crop/tillage status during this period significantly affects the risk of soil and nutrient losses. Periods with considerable amounts of precipitation and runoff give the largest losses from agricultural areas.

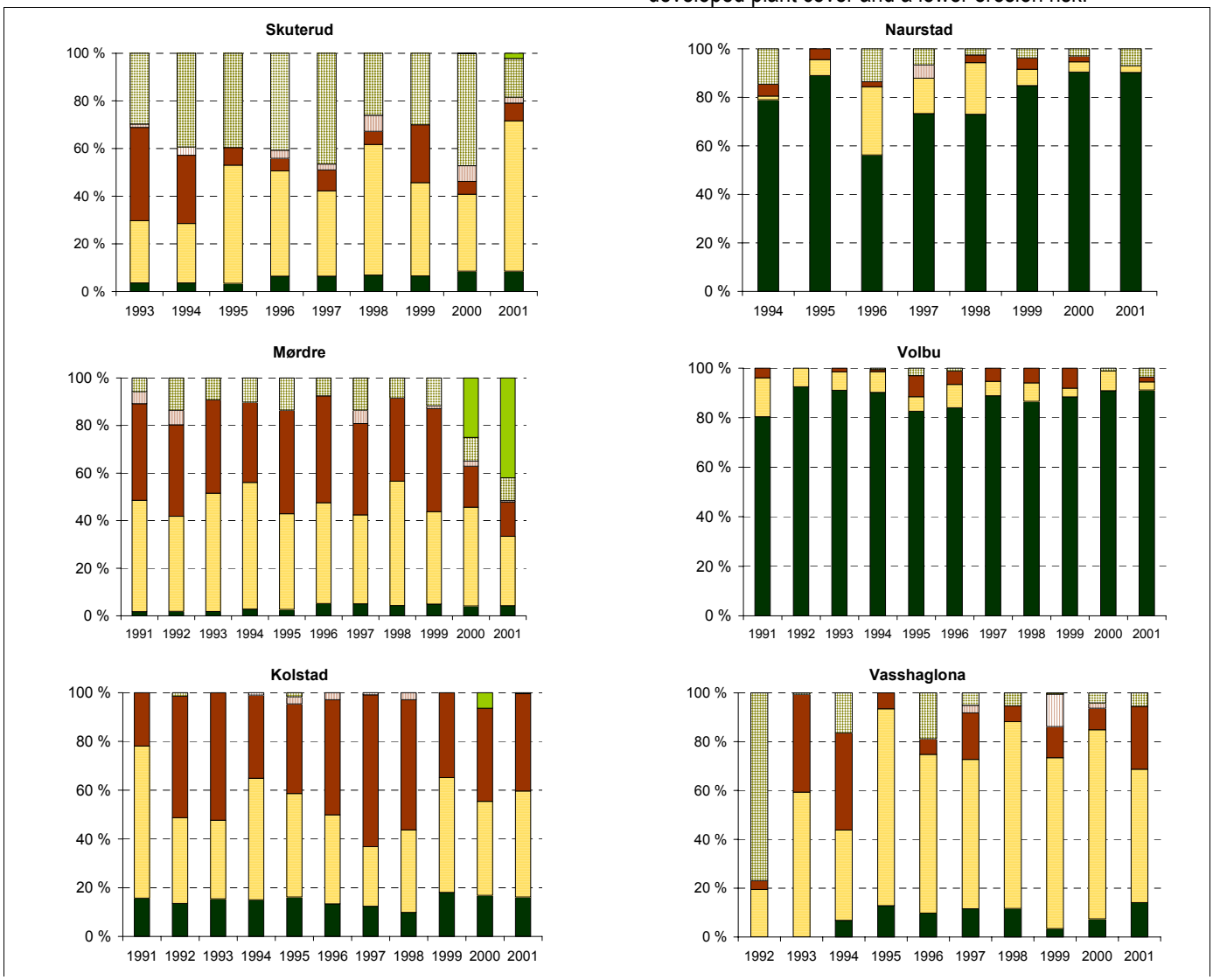
The areas with autumn ploughing show great annual variation, partly due to weather conditions and partly due to crop, for example winter wheat. It is normal practice to plough before sowing winter crops in the JOVA-catchments.

In the 1990s, the autumn-ploughed area in the Mørdre and Skuterud catchments decreased. Specific subsidies were used to increase the area of winter stubble.

Increased subsidies for sowing catch crops were introduced in 1999. Catch crops were sown on 42 % of the area in Mørdre in 2001.

Naurstad and Volbu are dominated by grass production, with nearly no autumn ploughing. Usually more than 80 % of the area is covered by grass during the winter.

Growing winter crops often implies early autumn ploughing. Growing conditions for the crop during autumn affect the erosion risk during winter. Early sowing gives a well-developed plant cover and a lower erosion risk.



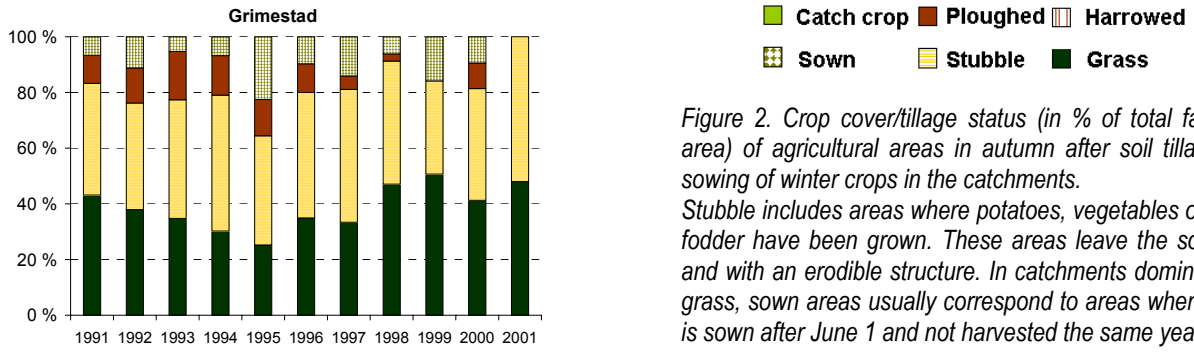


Figure 2. Crop cover/tillage status (in % of total farmland area) of agricultural areas in autumn after soil tillage and sowing of winter crops in the catchments.
Stubble includes areas where potatoes, vegetables or green fodder have been grown. These areas leave the soil open and with an erodible structure. In catchments dominated by grass, sown areas usually correspond to areas where grass is sown after June 1 and not harvested the same year.

LIVESTOCK

In Norway, the maximum number of animal units (AU) per ha agricultural area is 2.5. This corresponds to a phosphorus content in manure of 35 kg /ha. In Sweden, the limit is 22 kg P/ha. Figure 3 shows AU/ha for the catchments.

Livestock density has decreased in the catchments in eastern Norway (Skuterud, Mørdre, Volbu and Grimestad).

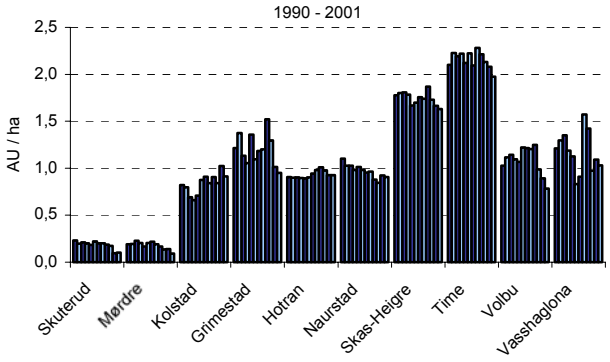


Figure 3. Total number of animal units (AU) on farms in the catchments divided by the total agricultural area. Shown as AU/ha for the years 1990-2001 (Source: Statistics Norway)

FERTILISER AND MANURE APPLICATION

Manure application in spring or the growing season is shown in Figure 4. In three of the five catchments with high livestock densities, more than 90 % of the manure was spread during spring or the growing season in 2001. Spreading of manure is not permitted on frozen or snow-covered fields and between 01 November and 15 February.

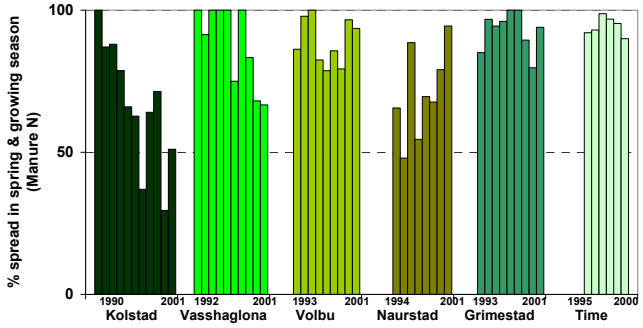


Figure 4. Share of manure (as total N) spread in spring or in growing season, for catchments with high livestock densities. Data for each catchment are shown for the monitoring period (varying number of years).

There was a decrease in N-application from 2000 to 2001, except for the catchments Skuterud and Mørdre. Total content of N in applied fertiliser and manure (not effective) is shown in Figure 5.

N-application levels in the catchments dominated by cereal production did not show large variation during the 1990s. On the other hand, there was a decrease in N application in the Volbu and Naurstad catchments.

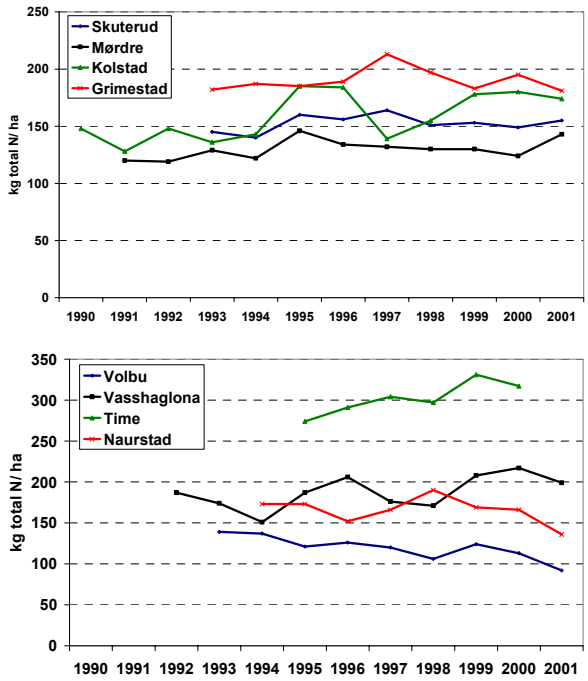


Figure 5. Application of N (kg total N/ha) in manure and fertiliser in catchments dominated by cereals (upper graph) and catchments dominated by grass or mixed production (lower graph).

Variation in P application between catchments is partly due to variation in livestock density, but differences in plant requirements for P also affect the P-application rate. The decrease in P-application in Naurstad and Volbu may be due to the reduction in number of livestock in the catchments, Figure 6.

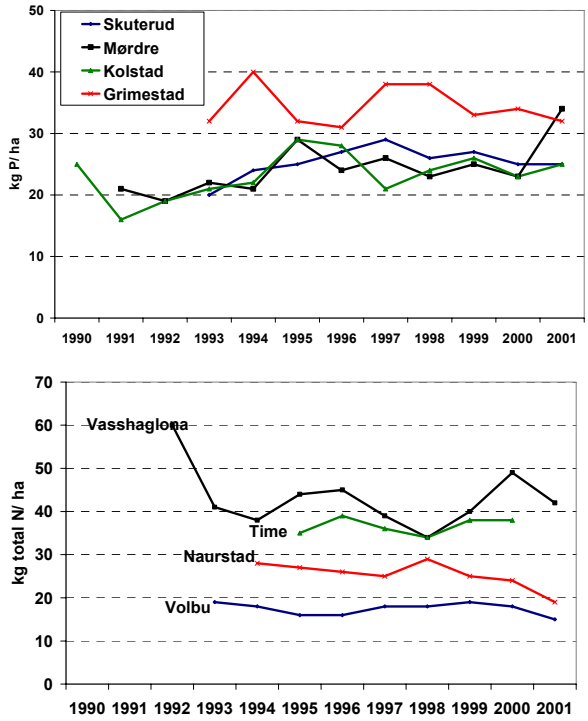


Figure 6. Application of P (kg total P/ha) in manure and fertiliser in catchments dominated by cereals (upper graph) and catchments dominated by grass or mixed production (lower graph).