

# How to get a nation to measure rainfall

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Figure 1: Rain gauge



Figure 2: Promoting on TV

## Background

From September 24. through October 1. 2006, the Norwegian Broadcasting Corporation (NRK) allowed the issue of weather and climate to permeate all its programme schedules and platforms. In all, more than 200 radio programmes and 125 TV programmes wholly or partially related to weather and climate were broadcast. The concept was named "Extreme Weather Week". In addition to radio, TV and webcasts, an exercise in which ordinary people could take an active part was desirable.

At the same time, the Norwegian Directorate for Education carried out its annual Science Drive. Previously, NRK and the Directorate for Education had co-operated in an exercise where sparrow sightings were reported to a website. In connection with the Extreme Weather Week, the organisations co-operated in a national campaign where schools and private individuals were invited to measure precipitation. This exercise was dubbed the "Rain Check" (Regnsjekken).

## Practical implementation

NRK promoted the campaign several weeks in advance, specially through Newton, a popular science programme for children. At the same time, the Directorate for Education posted information directly to all schools in Norway.

10,000 rain gauges were purchased for distribution. Schools were offered three rain gauges for free. The Science Days were held on Friday the 22. and Saturday 23. of September. In the four largest cities; Oslo, Bergen, Trondheim and Tromsø, NRK or the Norwegian Institute of Meteorology (met.no) had stands where they handed out rain gauges to registered participants. In addition, people could get a rain gauge via mail for the postage price, or buy their own gauges. Each individual was responsible for the quality of the placement of his or her own gauge. Instructions were drafted describing how the gauge should best be set up. These descriptions specially emphasised avoiding screening by trees, buildings or other objects.

The Directorate for Education's website, miljolare.no, provided the technical portal for reporting. Here, participants could submit their observations, and access their own data and those of others. In addition to submitting rainfall observations, participants could add photos and comments.

## Response

1995 participants carried out a total of 13,509 precipitation measurements during that one week. Among them were 1169 private individuals, 817 schools and 9 other participants. About 9 % of those who registered rainfall also provided a comprehensive assessment of the result. 1995 participants may not sound like much, but when one notes that among them, 817 were schools where students from several classes were involved, an estimate of about 100,000 individual participants seems plausible. Among the registered participants, 84 % completed the programme. It is also probable that a relatively large group carried out observations without reporting to the website. In the map, fig. 4, the national distribution of the observations is detailed, with increased density in urban areas.

## Results

In marketing the programme, special emphasis was placed on three elements:

1. Check whether the weather forecast is correct
2. Check your observations against those of the Institute of Meteorology
3. Check your observations against those of your neighbour

Fig. 7 includes maps over municipal averages, where rainfall measured during the Rain Check is compared with precipitation prognoses for the same day, and a grid based on precipitation measurements performed by the Institute of Meteorology. The pattern quite clearly shows that the geographical distribution of precipitation as recorded by the Rain Check was very much alike the geographical distribution as recorded by the Institute of Meteorology. When comparing observations from the Rain Check with forecasts from the Institute of Meteorology, one finds that the forecasts have failed to capture the same level of information as the Rain Check observations.

In the chart below, details from Norway's four largest cities have been highlighted. Here, the Rain Check average for the municipality is compared with forecasts from the municipal centre and the Institute of Meteorology's observations for the city in question. One can see that the discrepancy between the observations made by met.no and the Rain Check is fairly small, while the forecasts show a different pattern. One reason why the discrepancy between the observations is so small is connected to the fact that one utilised an average of measurements performed throughout the city in question. Using averages instead of individual series helps equalise any observational errors. The four municipalities had a fairly large amount of observations, something which reduces the effect of possible errors in individual measurements.

## Conclusion

It is incredibly exciting to initiate this sort of an experiment. Will there be any reaction from the general public? Will untrained observers be able to provide viable observations? Will someone sabotage measurements to attract attention? These were some of the questions we asked ourselves beforehand. When we saw data start to stream in, of generally good quality, we realised that our doubts were unfounded. The quality of work carried out on a voluntary basis by schools and private individuals made it extremely tempting to repeat the experiment in the future, as we will in connection with the Extreme Weather Week 2007.

One idea is to use such measurements to provide a more detailed picture of precipitation patterns during a major precipitation event, but meaningful resources have yet to be channelled towards such an effort.

## References

- Webpage used for reporting (only in Norwegian): [www.miljolare.no](http://www.miljolare.no)  
 Report from the Rain Check 2006 (only in Norwegian): [http://miljolare.no/tema/luftkvalitet/kampanjer/regnsjekken07/regnsjekkrapport2006.pdf](http://miljolare.no/tema/luftkvalitet/kampanjer/regnsjekken07/regnsjekkrappport2006.pdf)  
 User evaluation of the Rain Check (only in Norwegian): [http://miljolare.no/innsendt/pdf/oppslag/4/4663e68e0dfae/evaluering\\_regnsjekken2006.pdf](http://miljolare.no/innsendt/pdf/oppslag/4/4663e68e0dfae/evaluering_regnsjekken2006.pdf)



Figure 5: Distribution of the rain gauges



Figure 6: miljolare.no, the website used for reporting and exploring the data



Figure 3: Placement of gauges

	25. sep.	26. sep.	27. sep.	28. sep.	29. sep.	30. sep.	1. okt.
Akershus	176	193	190	179	163	84	80
Aust - Agder	36	39	43	39	39	18	15
Buskerud	84	92	93	90	79	39	38
Finmark	23	25	26	24	23	9	7
Hedmark	98	105	101	101	93	49	42
Hordaland	411	432	466	449	417	232	207
Møre og Romsdal	75	81	84	76	73	39	38
Nord - Trøndelag	106	107	107	110	109	58	51
Nordland	93	110	106	99	93	48	38
Oppland	73	86	79	77	69	27	24
Oslo	117	149	150	134	119	70	71
Rogaland	123	139	134	135	127	80	74
Sogn og Fjordane	48	56	56	51	54	28	30
Sør - Trøndelag	223	227	221	223	197	149	104
Telemark	62	68	70	64	65	43	39
Troms	75	81	83	81	75	53	48
Vest - Agder	88	85	87	85	73	57	55
Vestfold	68	78	74	76	71	28	25
Østfold	62	67	70	63	57	35	34
<b>Norway</b>	<b>204</b>	<b>222</b>	<b>224</b>	<b>215</b>	<b>199</b>	<b>114</b>	<b>102</b>
	1	0	0	6	6	6	0

Table 1: Number of measurements

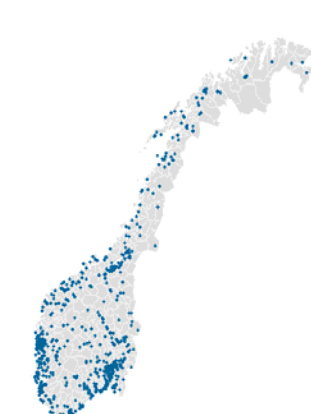
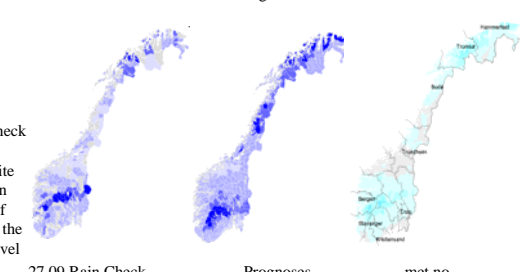
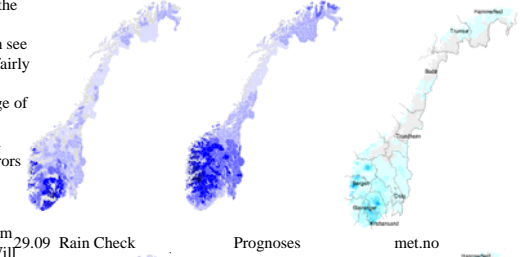


Figure 4: Location of measurements

25.09 Rain Check Prognoses met.no



27.09 Rain Check Prognoses met.no



29.09 Rain Check Prognoses met.no



Figure 7: Comparison of measurements by the various sources. From the left the maps for Rain Check, prognosis, and met.no (as presented on senorge.no) Legends are presented below

Dato	Oslo			Bergen			Trondheim			Tromsø		
	met.no	Prognosis	Rain Check	met.no	Prognoses	Rain Check	met.no	Prognoses	Rain Check	met.no	Prognoses	Rain Check
25.09.2006	2,0	4,5	2,2	1,2	1,9	1,9	0,0	0,3	0,0	10,8	11,4	10,0
26.09.2006	.	1,1	0,1	1,5	0,9	2,5	0,0	0,6	0,0	0,4	6,8	0,8
27.09.2006	3,6	5,3	3,9	42,0	23,2	42,9	0,0	2,8	0,3	2,6	2,6	3,9
28.09.2006	1,6	3,7	2,1	10,0	1,1	8,4	2,9	3,6	3,7	.	0,5	0,4
29.09.2006	3,3	0,8	3,1	15,4	8,3	15,4	4,4	7,9	5,3	.	0,0	0,0
30.09.2006	2,4	15,4	4,1	1,4	17,0	2,5	4,3	1,8	5,5	.	0,0	0,0
01.10.2006	35,3	13,9	28,1	13,9	25,7	11,7	0,4	1,5	1,0	.	0,0	0,0

Table 2: Comparison of measurements and prognosis in four major towns. Met.no is the official measurements, Prognosis is based on Hirlam, and Regnsjekken is of course this project.

