References

1) Reactive Nitrogen in the Environment (page 48)
http://www.whrc.org/policy/PDF/Reactive_Nitrogen_sml.pdf
UNEP and WHRC. Reactive Nitrogen in the Environment: Too Much or Too Little of a Good Thing. United Nations Environment Programme, Paris, 2007.
Reactive nitrogen (Nr) includes all biologically, chemically, and radiatively active nitrogen compounds in the atmosphere and biosphere. It includes forms of nitrogen, such as ammonia (NH3) and ammonium (NH4+), nitric oxide (NO), nitrogen dioxide (NO2), nitric acid (HNO3), nitrous oxide (N2O), and nitrate (NO3-), and organic compounds such as urea, amines, proteins and nucleic acids.

2) Human Sources of Reactive Nitrogen
http://www.medscape.com/viewarticle/482775_3
Where does all this human-generated reactive nitrogen come from? The largest contributor is nitrogen fertilizer. As of 2000, about 100 Tg of reactive nitrogen were released each year from nitrogen fertilizer spread on farmlands around the world, according to the BioScience review.

3) Beyond Carbon: Scientists Worry About Nitrogen's Effects
http://www.nytimes.com/2008/09/02/science/02nitr.html?_r=1
"The nitrogen dilemma," Dr. Vitousek added, "is not just thinking that carbon is all that matters. But also thinking that global warming is the only environmental issue. The weakening of biodiversity, the pollution of rivers, these are local issues that need local attention. Smog. Acid rain. Coasts. Forests. It's all nitrogen."…
When an ecosystem has too much nitrogen, the first response is that life blossoms. More fish, more plants, more everything. But this quickly becomes a kind of nitrogen cancer. Waters cloud and are overrun with foul-smelling algae blooms that can cause toxic "dead zones."

4) European Nitrogen Policies and Future Challenges
www.nine-esf.org/?q=fileshare/files/237/ENA_brochure_v3.pdf
There is a low public understanding of the importance of excess nitrogen as a threat affecting many environmental issues. The complexity of multi-pollutant – multi-effect interactions is a major hurdle to improving public awareness.

5) The problems of reactive nitrogen.
http://www.economist.com/science/displaystory.cfm?story_id=11367884
Too much nitrogen being washed into the sea is causing dead zones to spread alarmingly. From *The Economist* print edition.

6) Reactive nitrogen on earth by human activity, with projection to 2050.
Cartographer/Designer: *Philippe Rekacewicz, Emmanuelle Bournay, UNEP/GRID-Arendal*
http://maps.grida.no/go/graphic/reactive-nitrogen-on-earth-by-human-activity-with-projection-to-2050
Reactive nitrogen on earth by human activity, with projection to 2050. The range of the natural rate of bacterial nitrogen fixation in natural terrestrial ecosystems (excluding fixation in agroecosystems) is shown for comparison. Human activity now produces approximately as much reactive nitrogen as natural processes do on the continents.

7) Reactive nitrogen http://www.mnp.nl/en/dossiers/integral_nitrogen/moreinfo/Reactivenitrogen.html
The same atom of reactive nitrogen (Nr) can cause multiple effects in the atmosphere, terrestrial ecosystems and freshwater and marine systems; there are also effects on human health. We call this sequence of effects the nitrogen cascade.

8) International Nitrogen Initiative http://www.initrogen.org/
The International Nitrogen Initiative is dedicated to optimizing the use of nitrogen in food production, while minimizing the negative effects of nitrogen on human health and the environment as a result of food and energy production.
Among the many facets of the International Nitrogen Initiative are scientific assessment, development of solutions to solve a wide variety of nitrogen-related problems, and interactions with policymakers to implement these solutions.

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References

9) Nitrous Oxide Emissions and the Anthropogenic Nitrogen in Wastewater and Solid Waste
Philip K. Barton and James W. Atwater
http://gis.lrs.uoguelph.ca/AgriEnvArchives/bioenergy/nutrient_flow_btb.html
Sources of Mineral Fertilizers - In many parts of the world, major nutrients such as phosphorus (phosphates) and potassium (potash) are considered to be non-renewable resources because they are mined from finite natural deposits, and are used to supplement livestock-based nutrients in crop production. Some phosphate deposits have elevated levels of heavy metals, such as cadmium, which limits their safe use in crop production.
The production of nitrogen-based fertilizers, through the Haber process of converting atmospheric nitrogen into ammonia or urea, is a rather energy-intensive process requiring large amounts of natural gas, which also has associated greenhouse gas emissions.
Thus it makes both economic and environmental sense to conserve and recycle as much existing mineral fertilizers as is practicable.

10) Reactive N in the global hydrologic system
http://www.mnp.nl/en/dossiers/integral_nitrogen/moreinfo/ReactiveNintheglobalhydrologicsystem.html
In combination with increased N fluxes during the past decades, similar changes have occurred with P, while the Si loads have remained constant or even decreased in many rivers primarily as a result of dam construction. This has often altered the stoichiometric balance of N, P and Si which may not only affect the total production in freshwater and coastal marine systems, but also its quality.
In freshwater systems often phosphate is the major cause of eutrophication, while in coastal marine systems generally nitrogen is the major element causing eutrophication.

11) Global Nitrogen: Cycling out of Control: Regaining Control
http://www.medscape.com/viewarticle/482775_8
Reducing the amount of reactive nitrogen that is added to the environment is critical, Galloway says. Of the nitrogen that is created to sustain food production, only about 2-10% enters the human mouth, depending on the region. The rest, he says, is lost to the environment: "Unless an equivalent amount is denitrified back to molecular N2, then that means reactive nitrogen is accumulating in the environment, in the atmosphere, in the groundwater, in the soils, in the biota."

12) Reactive nitrogen distribution and partitioning in the North American troposphere and lowermost stratosphere http://www.agu.org/pubs/crossref/2007/2006JD007664.shtml
A comprehensive group of reactive nitrogen species (NO, NO2, HNO3, HO2NO2, PANs, alkyl nitrates, and aerosol-NO3 −) were measured over North America during July/August 2004 from the NASA DC-8 platform (0.1–12 km). Nitrogen containing tracers of biomass combustion (HCN and CH3CN) were also measured …

13) Nitrogen in Aquatic Ecosystems http://ambio.allenpress.com/perlserv/?request=get-document&doi=10.1639%2F0044-7447(2002)031%5B0102%3ANIAE%5D2.0.CO%3B2&ct=1
Over the last two decades it has become increasingly apparent that the effects of excess nutrients and eutrophication in coastal systems are not minor and localized, but have large-scale implications and are spreading rapidly.

14) The Nitrogen Cascade http://caliber.ucpress.net/doi/abs/10.1641/0006-3568(2003)053%5B0341:TNC%5D2.0.CO%3B2
As the cascade progresses, the origin of Nr becomes unimportant. Reactive nitrogen does not cascade at the same rate through all environmental systems; some systems have the ability to accumulate Nr, which leads to lag times in the continuation of the cascade. These lags slow the cascade and result in Nr accumulation in certain reservoirs, which in turn can enhance the effects of Nr on that environment. The only way to eliminate Nr accumulation and stop the cascade is to convert Nr back to nonreactive N2.

15) Global Nitrogen: Cycling out of Control: A Vicious Cycle?
http://www.medscape.com/viewarticle/482775_4
"If you put a molecule of NOx in the atmosphere from fossil fuel combustion or a molecule of ammonium on an agricultural field as a fertilizer," he explains, "you have a whole series, or cascade, of effects that goes from acid rain to particle formation in the atmosphere, decreasing visibility and causing impacts on human health, acid rain, soil and stream acidification, coastal eutrophication, decreasing biodiversity, human health issues in groundwater, and nitrous oxide [N2O] emissions to the atmosphere, which impact the greenhouse effect and stratospheric ozone."

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References

16) Global Nitrogen: Cycling out of Control: Nitrogen in the Air
http://www.medscape.com/viewarticle/482775_5
NOx, which can form from the application of nitrogen fertilizers, burning of biomass, and combustion of fossil fuels, is an important contributor to the formation of smog and ground-level ozone.
National Institute for Space Research, says that reductions in ozone suggest a 10-20% increase in ultraviolet-B radiation, which would "explain a 20-40% rise in skin cancer in the human population since the 1970s."

17) Nitrogen in the Water http://www.medscape.com/viewarticle/482775_6
High concentrations of nitrates can cause methemoglobinemia--or "blue baby disease"--in infants. In blue baby disease, nitrate ions weaken the blood's capacity to carry oxygen. Epidemiological studies have also linked nitrates to reproductive problems and some cancers, including increased risks for bladder and ovarian cancers at concentrations below 10 parts per million.

18) Global Nitrogen: Cycling out of Control
http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1247398
Human production of reactive nitrogen is currently estimated to be about 170 Tg per year, write Galloway and colleagues in the BioScience review, and the global use of nitrogen fertilizers is increasing by about 15 Tg per year. The ratio of anthropogenic to natural reactive nitrogen creation is likely to increase with population increases…
We know the global nitrogen system is being disrupted, Galloway says. “What we don’t know is the rate that nitrogen is accumulating. And because reactive nitrogen contributes to many environmental issues of the day, the more you have, the faster the rate of accumulation, and the more you’re going to have an increase in the effects and distribution of the effects.”
“Humans are changing the nitrogen cycle globally faster than any other major biogeochemical cycle—it’s just going through the roof in a hurry,” Townsend says. “The problems with that are remarkably diverse and widespread, and we really need to do something about it. But I think the good news is that there are a lot of ways to envision that we could do something about it without utterly turning socioeconomic systems on their ear.”

19) Dead water and your nitrogen footprint http://www.cdnn.info/news/eco/e080602.html
…..the north-western coastal area of the Black Sea provides an accidental example of how some places might, if given the chance, improve very quickly. After the collapse of the centrally planned economies of eastern and central Europe, the use of manufactured fertilisers declined because they were no longer affordable. Within seven years the Black Sea's dead zone had largely vanished and fisheries had recovered.

20) UNEP Report: Reactive Nitrogen in the Environment
http://www.whrc.org/policy/Reactive_nitrogen.htm
...Nitrogen is an essential, fundamental building block for life. It is the most plentiful element in the earth’s atmosphere, yet in its molecular form (N2), it is unusable by the vast majority of living organisms. It must be transformed, or fixed, into other forms, collectively known as reactive nitrogen (See Glossary), before it can be used by most plants and animals. Without an adequate supply of nitrogen, crops do not thrive and fail to reach their maximum production potential. In many ecosystems, nitrogen is the limiting element for growth. However, when present in excess, reactive nitrogen causes a range of negative environmental effects, poses risks to human health and consequently can have negative economic and social consequences…

Too Much or Too Little of a Good Thing. http://www.whrc.org/policy/Reactive_nitrogen.htm
About 40 percent of the human population depends upon food production made possible by synthetic nitrogen fertilizers.

Comment:
"If we use for production of organic fertilizers, in the local systems with high precision, all the nitrogen that we allow to disappear in the air, or that is sent to incineration, or that is transported by water, or that is buried in landfills and other places, so there is no need for synthetic nitrogen."

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