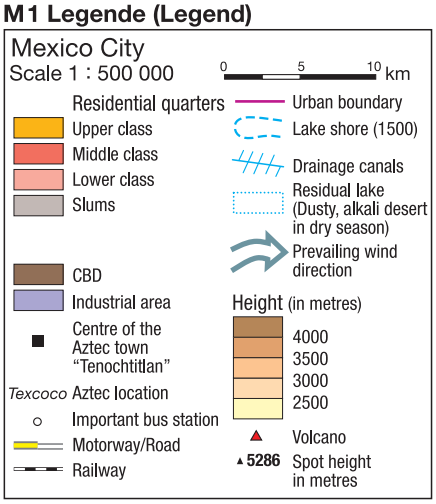
Aufgaben

1. Beschreiben Sie die topographische und klimatische Lage von Mexiko-Stadt (Atlas, M1 – M3)!
2. Erklären Sie, wie die Luft in Mexiko-Stadt von anthropogenen Faktoren beeinflusst wird (M4 - M8)!
3. Vergleichen Sie die Luftverschmutzung von Mexiko-Stadt mit der von einer anderen Stadt in M8! Schlagen Sie mögliche Erklärungen für die Unterschiede vor (Atlas, M5, M6, M8)!
4. Schildern Sie die mögliche Entwicklung von Mexiko-Stadt unter Beachtung der aktuellen Luftsituation (M3, M4, M6, M7, M9, M10)!

Tasks

1. Describe the topographic and climatic location of Mexico City (Atlas, M1 – M3).
2. Explain how the air in Mexico City is affected by human factors (M4 – M8).
3. Compare the air pollution of Mexico City with that of another town in M8. Suggest possible explanations for differences (Atlas, M5, M6, M8).
4. Considering the air situation today portray the possible development of Mexico City (M3, M4, M6, M7, M9, M10).

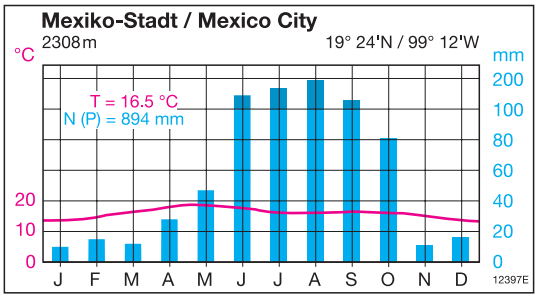
M1 Legende (Legend)



ADDITIONAL VOCABULARY

Flughafen - airport
nach - to
Sodakonzentrations-schnecke - caustic soda plant
Stadion - stadium
Stausee - reservoir
Texcocosee - Lake Texcoco
Universität - university

M2 Klimadiagramm (Climate graph)



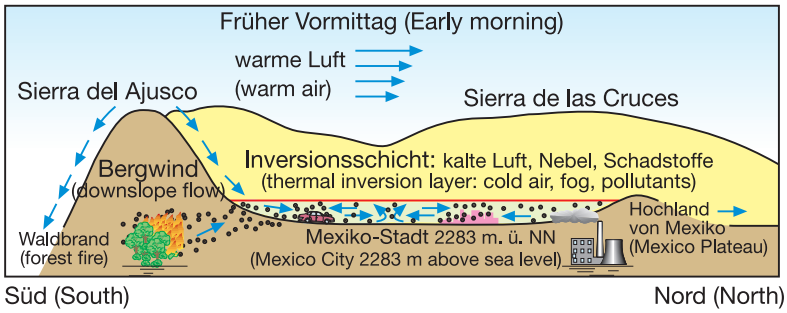
M3 Internetausschnitte (Internet clippings)

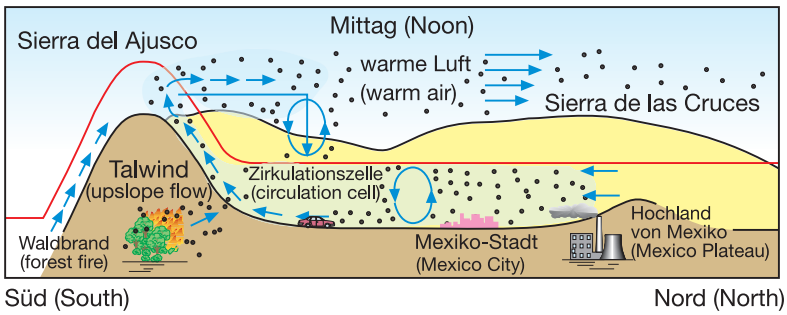
Green Left online	Mexico City: for half the year, don't breathe" (1992)
Health and Energy Company	"Any primary school teacher knows a disturbing fact of life in Mexico's capital: children rarely use the color blue when they paint the sky..." (1998)
CNN THE WORLD'S NEWS LEADER	"Thick smog makes life difficult in Mexico" (1998)
BBC	"Mexico City's dirty truth" (2002)
USA TODAY usatoday.com	"Mercury from China, dust from Afrika, smog from Mexico - all of it drifts freely across U.S. borders and contaminates the air millions of Americans breathe..." (2005)

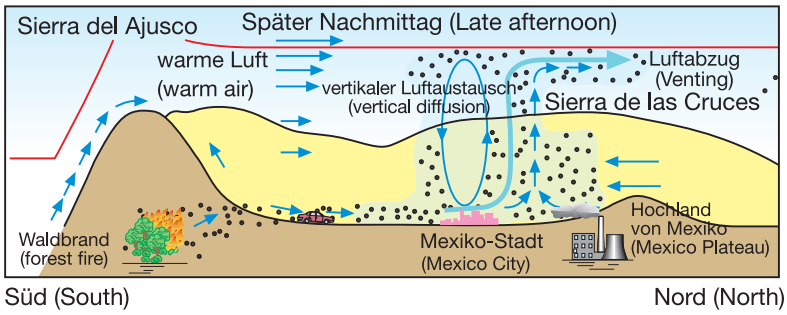
M4 Bevölkerungsentwicklung in Mexiko-Stadt (population dynamics in Mexico City)

Jahr (Year)	Bevölkerung in Millionen (Population in millions)
1940	1,6
1950	3,1
1960	4,9
1970	6,9
1980	8,0
1990	8,2
2000	8,6
2010*	10,8

M5 Inversionswetterlage im Tal von Mexiko (Thermal inversion in the Valley of Mexico)







* Schätzung / estimate

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M 6 Schadstoffliste und Quellen (List of pollutants and sources)

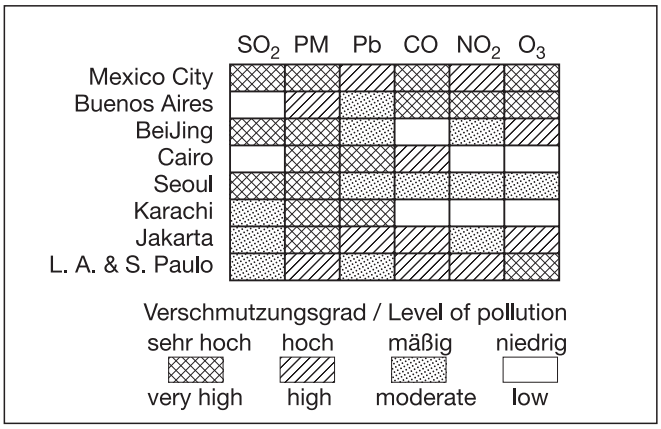
Quellen	deutsch	Schadstoff/ Pollutant	englisch	Sources
Kraftwerke	Schwefeldioxid	SO_2	sulphur dioxide	power plants
Autoabgase, Industrien, Kraftwerke, Müllverbrennungs-anlagen	Feinstaub < 10µm	PM_{10}	particulate matter smaller than < 10 µm	automobile exhaust, industries, power plants, refuse incinerators
Autoabgase	Blei	Pb	lead	automobile exhaust
Autoabgase, Industrien	Kohlenmonoxid	CO	carbon monoxide	automobile exhaust, industries
Autoabgase, Kraftwerke	Stickoxide	NO_x	nitrous oxide	automobile exhaust, power plants
NO_x /Kohlenwasserstoffe (flüchtige organische Verbindungen) + Sonnenlicht	Ozon	O_3	ozone	NO_x/hydrocarbons (VOCs=volatile organic compounds) + sunlight

M 7 Anzahl der Tage pro Jahr, an denen die Normwerte in Mexiko-Stadt überschritten wurden (1990 - 2004) Number of days per year on which the norms in Mexico City were exeeded (1990 - 2004)

Jahr (Year)	Ozon (Ozone) Tage (Days)	PM_{10} Tage (Days)	CO Tage (Days)	SO_2 Tage (Days)	NO_2 Tage (Days)	Pb-Blei (Lead) Tage (Days)
1990	325	58	141	11	31	4
1991	335	13	93	8	16	2
1992	317	21	56	29	8	1
1993	320	41	17	0	29	0
1994	340	33	11	0	26	0
1995	319	30	4	0	32	0
1996	317	42	6	0	84	0
1997	311	28	1	0	38	0
1998	305	27	4	0	30	0
1999	286	33	2	0	19	0
2000	308	16	1	1	23	0
2001	273	5	0	8	1	0
2002	281	5	0	0	0	0
2003	253	6	0	0	6	0
2004	225	1	0	0	3	0

Quelle (Source): Sistema Nacionales Estadistico y de Informacion Geografica, 2006

M 8 Die Städte mit der größten Luftverschmutzung (Cities with the greatest air pollution)



Quelle (Source): Adaptiert von Maricela Yip und Pierre Madl: Air pollution in Mexico City 2002

M 9 Vokabeln für M10

air pollution - Luftverschmutzung
congestion - Verkehrsstau
contribute (to) - beitragen
control measures - Überwachungsmaßnahmen
exeed (to) - überschreiten
fuel - Treibstoff
growth of population - Bevölkerungswachstum
increase - Zunahme
lack of - Mangel an
major source - Hauptquelle
services - Dienstleistungen
vehicle - Fahrzeug

M 10 Die Situation heute (The Situation Today)

„Mexico City has become known for its air pollution problem as a result of the rapid growth of population, industry, and services, which encouraged an enormous increase in transportation activity and related pollutant emissions. In the 1990s, the Mexican government implemented pollution control measures on vehicles and fuels, which successfully reduced the ambient concentrations of three criteria pollutants: lead (Pb), carbon monoxide (CO), and sulfur dioxide (SO_2). Nonetheless, air quality standards for other pollutants are still frequently violated. For example, the ozone standard was exceeded on 80–90% of the days every year between 1988 and 2000, and the daily standard for PM_{10} (particulate matter of aerodynamic diameter 10 µm and less) was violated on more than 20% of the days in 1995–1998.
As in most large cities, the transportation sector in Mexico City is a major source of air pollution. The vehicle population is estimated to be 3.6 million, and factors such as congestion, lack of emission controls on many vehicles and poor fuel quality contribute to higher vehicle emissions. According to the government's 2002 emission inventory, mobile sources contribute over 99% of all CO, 84% of nitrogen oxides (NO_x), 39% of hydrocarbons (HC), 58% of SO_2, 19% of PM_{10}, and 52% of $PM_{2.5}$ emitted in the Mexico City Metropolitan Area (MCMA). [...]"

Quelle (Source): M. Jiang et al.: Mobile laboratory measurements of black carbon, polycyclic aromatic hydrocarbons and other vehicle emissions in Mexico City. Atmos. Chem. Phys. Discuss., 5, 7387–7414, 2005.

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