

**Tüskés Gábor** (\* 1955) a Magyar Tudományos Akadémia Bölcsészettudományi Kutatóközpont Irodalomtudományi Intézetének osztályvezetője, tud. tanácsadója, az Eszterházy Károly Egyetem Világirodalom Tanszékének tanszékvezető egyetemi tanára, az Eötvös Loránd Tudományegyetem egyetemi magántanára. Humboldt-díjas (2015).



Az Osztrák és a Magyar Tudományos Akadémia Irodalom- és Kultúratudományi Bizottságának alelnöke, a Grimmshausen Társaság vezetőségi tagja, a Görres Társaság tudományos tanácsadó testületének tagja. Fő kutatási területei: az irodalomtudomány története és elmélete, textológia, neolatin irodalom, 17–18. századi eszme- és művelődéstörténet, irodalom és képzőművészet, elbeszéléskutatás, német–magyar irodalmi kapcsolatok. Fontosabb publikációk: A XVII. századi elbeszélő egyházi irodalom európai kapcsolatai (1997); Az egyházi irodalom műfajai a 17–18. században (2002, társszerző: Knapp É.); Populáris grafika a 17–18. században (2004, társszerző: Knapp É.); Sedes Musarum. Neolatin irodalom, tudománytörténet és irodalomelmélet a kora újkori Magyarországon (2009, társszerző: Knapp É.); Író a száműzetésben: Mikes Kelemen (2012, szerk.); Hagyomány és kritika (2013); A Fortunatustól a Törökországi levelekig. Válogatott tanulmányok (2015, társszerző: Knapp É.).

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## **Eco-themes and Climate Change in Literature\***

*G. Tüskés*

### **Abstract**

In the first half of the lecture I will deal with Humboldt's take on nature and climate. Then I will present some works of critical response to the effects of technology and ecological damage taken from 19-20th century English, American and German literature. Finally, I will give an analysis of the various occurrences of climate change in literature through a number of fictional pieces from the past two decades.

Some conclusions:

1. Humboldt was one of the first to rise awareness of the importance of climate change caused by mankind. His concept about the balance and interaction of forces within nature, relationship between man and nature, together with regarding sciences and humanities as one unity are all worth taking into consideration in our times, since they might help us establish a mutually favourable relationship with nature and encourage a creative approach to environment protection.

2. Today there are no irrefutable arguments against the theory of antropogenic climate change. Ten years ago the Stern Report revealed that global climate protection could be achieved in less than one percent of the world's gross output.

3. Climate change is a cultural change, and climate literacy is about understanding the social, cultural and human dimensions of climate change.

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\* A szerző a Humboldt – Kolleg Budapest 2015 „Symposium on International Climate Protection” (13 – 14th November 2015) konferencián tartott előadásának összefoglalója.

4. In order to understand global warming, we should see it within a broader network of discourses and social practices. Literary studies can make a significant contribution to the rapidly evolving climate change and climate protection debate.

5. It is time to heed the warnings of historic ecology, and listen to what writers and poets say about traditional strategies concerned with protecting forests and waters, that is our climate, about current developments in climatic and hydrological conditions, about ruining our environment and it being irreversible.

6. The best climate change novels call for a new perspective when tackling global, regional and local questions which do not fit into national politics.

## Eco-Themes and Climate Change in Literature\*

Gábor Tüskés

The starting point of this paper corresponds with the basic idea of multidisciplinary climate research according to which anthropogenic climate change can no longer be perceived as a matter for scientists to explore. Anthropogenic climate change is, as Gregers Andersen recently pointed out, in some sense a culturally constructed phenomenon which can also be investigated by any researcher of cultural studies and a number of other humanities dealing with the narrative and historical dimensions of culturally constructed objects (Andersen 2015). In the first part of my paper I will deal with Alexander von Humboldt's take on nature and climate. Then I will present some works of critical response to the effects of technology and ecological damage taken from 19-20<sup>th</sup> century English, American and German literature. Finally, I will give an analysis of the various occurrences of climate change in literature through a number of fictional pieces from the past two decades.

### I

If we wish to understand the true substance of nature, there is probably no better guide than Humboldt's *Views of Nature* (Humboldt 1808). The collection is written in classic German, and consists of six studies, which have been supplemented by a narrative since the second edition. Humboldt is not concerned with simply presenting factual information, but rather seeks to shed light on

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\* A tanulmány a szerző Humboldt – Kolleg Budapest 2015 “Symposium on International Climate Protection” 13 – 14th November 2015 konferencián tartott előadásának bővített, írott változata.

the inner workings of the forces of nature and the harmonious cooperation between them, and to put forward a comprehensive concept, the essence of which is the unison between the material world and man's ethical-aesthetic stance. During his journey in America prior to writing his book, Humboldt did not restrict himself to merely studying one discipline, but wanted to gain an overview of the whole of nature. His approach is that of a genuinely curious person who believes in morphological examination; someone who views nature as a single entity, as opposed to the isolating tendencies prevailing in modern scientific research (Fig.1).

One piece of the collection, entitled *Life-force, or the Genius of Rhodes*, Humboldt's only philosophical-allegorical treatise, is of special interest to us (Humboldt 2012). The point of origin is the vitalist teaching on life-forces, which later Humboldt rejected as a consequence of having studied chemistry and physiology; he never, however, completely abandoned the idea about the connections between the organic and inorganic conditions of matter (Weatherby 2012). This organic philosophy is also apparent in his late work, *Cosmos* (Humboldt 1845–1862) (Fig.2).

Humboldt focuses here on the complexities of the whole, and lays great emphasis on presenting scientific data in a linguistically flawless manner. He begins by describing the universe and ends with depicting mankind. His holistic perspective is apparent from the fact that scientific and historical reasoning follow each other in the chapter discussing human imagination and the effect of nature on man's state of mind. "Contemplating nature," remarks Humboldt, "should be universal, grand and free, unrestricted by considerations of perceived usefulness." The purpose of this is for any image of nature to represent the harmony of nature as a whole, and to be similar to a work of art with regard to the effect it has on the observer. This concept of nature being a living entity has been increasingly dismissed by modern thinking, which is primarily interested in the usefulness of various natural phenomena.

Humboldt's holistic understanding of nature is closely related to Goethe's approach, since both of them were interested in the renewable forces that drive natural processes (Bratranek 1876). According to Humboldt, one such factor is climate, an issue he treats with clearly interest in his works. He not only established close connections between natural phenomena and their order through phytogeography and mineralogy, but also through climatology. During his expedition to America, besides carrying out astronomical and geophysical measurements, he did comprehensive climatological research and recorded his observations about the characteristics of climate. He was one of the first to distinguish between continental and maritime climate, and presented an overview of how plants spread and interact with their environment in relation to changes in temperature.

According to the preface to the second and third edition of *Views of Nature*, his expedition commissioned by the tsar into the Asian territories of Russia, which he embarked on in 1829, had significantly altered – inter alia – people's perception of how climate affected natural processes. The scientific assessment of the journey entitled *Central Asia – Research into mountain ranges and comparative climatology* first appeared in 1843 in French (*Asie Centrale – Recherches sur les chaînes de montagnes et la climatologie comparée*), and a year later in German (Fig.3). The latter was translated by the physician Wilhelm Mahlmann, whose own related findings were included at the end of the second volume in the four charts on temperatures across the two hemispheres (Humboldt 1844) (Fig.4).

Humboldt systematically studied climate in relation to other natural phenomena. In his methodology he trusted only direct observation and deduction based on factual findings. His research into climatology primarily involved dealing with temperature and the moisture content of the air, while also comparing the climate of Asia, Europe and America and discussing the reason behind isotherm curves. The supplement to the part on clima-

tology contains several observations on the temperature of soil, springs, mines and rivers, together with the issue of underground ice. Humboldt carried out painstakingly thorough studies into the difference in climate between the eastern and western slopes of the Alleghany Range, and likewise explored the effect of deforestation and the expansion of human civilisation on the annual, winter and summer average temperatures. This book has been recognised ever since as one of the fundamental works of comparative climatology (Fig.5-6).

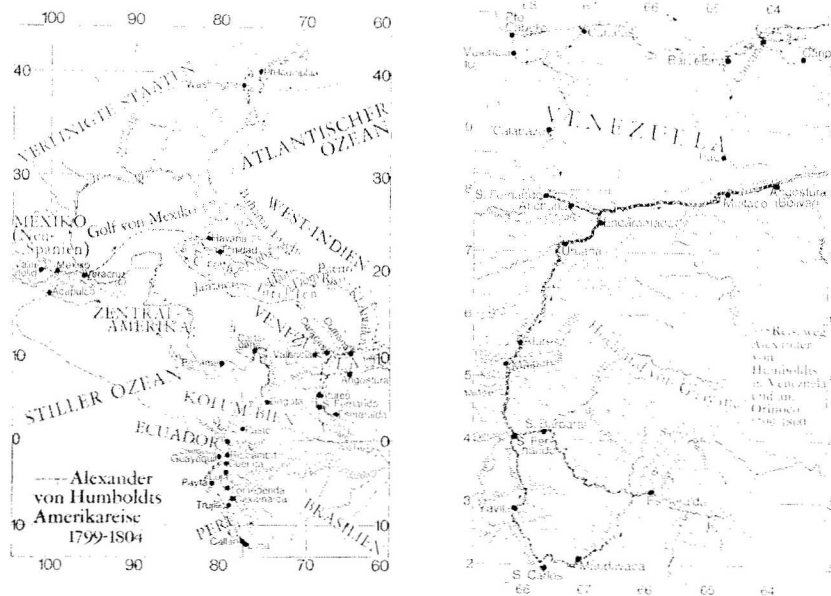


Figure 1: Humboldt's journeys in America

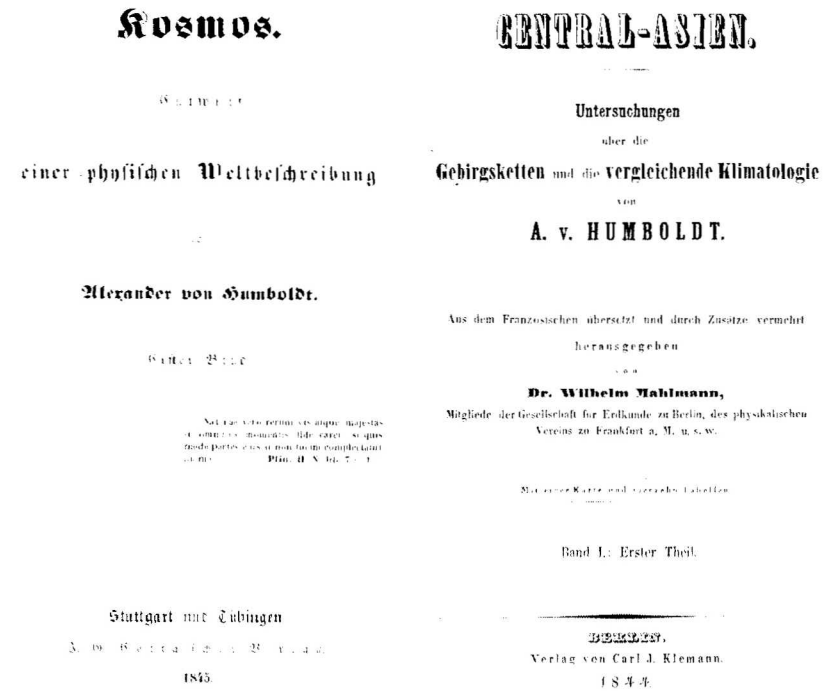


Figure 2-3: Title-pages of the works *Cosmos* (1845) and *Central Asia* (1844)

# Vertheilung der WÄRME AUF DER ERDOBERFLÄCHE IN DER JÄHRLICHEN PERIODE.

WILHELM MAHLMANN.

(Mittlere Temperaturen des Jahres, der Jahreszeiten und des kältesten und wärmsten Monats. Wärmegrade über 0° sind ohne das Zeichen + angegeben.)

Taf. I. Von -18.7° bis +6.8° mittlere Jahreswärme.

Ort	Breite	Länge von Paris	Höhe von Paris	Mittlere Temperatur, Centesimale							Zahl der Beobachtungsjahre und Bemerkungen.
				Jahr	Winter	Frühling	Sommer	Herbst	Jahres- mittel	Wärmste Monat	
1. Melville-Insel	74 47 n.	112 8 w.	—	—	—18.7	—15.9	—12.8	—10.9	—14.6	—35.8 Febr.	1. Schiffbeobachtungen. Pastry
2. Igloolik-Insel	69 19 n.	84 23 w.	—	—	—16.0	—12.7	—10.8	—17	—14.9	—35.5 Dec.	1. 1873-74, 79.
3. Umanak	70 55 n.	131 22 w.	—	—	—16.8	—13.1	—11.7	—9.2	—13.9	—40.3 Juli	1. 3. v. Wrangel
4. Pt. Barrow	71 14 n.	91 15 w.	—	—	—18.8	—14.7	—11.9	—7.7	—11.9	—31.8 -	1. Schiffbeobachtungen
5. Boothia Felix	70 2 n.	94 10 w.	—	—	—18.2	—13.2	—10.7	—8.1	—12.1	—36.0 Juli	1. Schiffbeobachtungen
6. Winter Island	68 11 n.	85 30 w.	—	—	—11.0	—20.1	—11.2	—1.7	—8.0	—31.1 -	1. Schiffbeobachtungen
7. Ft. Confidence	68 54 n.	121 9 w.	—	—	—	—32.1 -	—	—	—31.1 Jan.	16.3 Jan.	1
8. Nachen-Kolymak	68 32 n.	158 31 w.	—	—	—	—20.1 -	—	—	—31.2 Dec.	—	1
9. Ft. Enterprise	64 28 n.	115 20 w.	150	—	—	—20.9 -	—	—	—31.2 Dec.	—	1
10. Jakutsk	62 1 n.	127 24 w.	15	—	—10.5	—7.9	—3.4	—18.2	—10.8	—30.3 Febr.	1. 3. neuer St. (alter St.?)
11. Nowaja Semlja	70 57 n.	55 27 w.	—	—	—9.4	—16.0	—15.9	—2.9	—7.9	—23.7 März	1. Felsenk., Kanak-Peise, Neuer St.
12. -	73 19 n.	51 30 w.	—	—	—8.1	—19.0	—11.8	—3.9	—6.3	—24.1 Febr.	1. Matschik-Schar, Neuer St.
13. Ft. Franklin	65 12 n.	125 11 w.	35	—	—8.2	—27.2	—10.0	—10.2	—6.0	—30.2 Jan.	1. 2. westlich von der Hudson-B.
14. Ft. Belknap	62 06 n.	109 1 w.	55	—	—	—29.1 -	—	—	—10.7	—31.7 -	1. 2. (am 13. Juli, Febr. neuer St.)
15. Spitzbergen	80 -	11 -	—	—	—	—	—	—	—3.4	—	1
16. Grönlandisches Meer	58 -	8. Spitzb.	—	—	—	—	—	—	—9.4	—	1
17. Nowaja Semlja	73 57 n.	52 28 w.	—	—	—7.3	—11.1	—10.5	—4.2	—7.4	—17.2 Nov.	1. 6. 12. Spitzb., Schiffbeobacht.
18. Grönlandisches Meer	72 -	21 -	—	—	—	—	—	—	—1.1	—	1. 1. Spitzb. B., Neuer St.
19. -	80 -	8 -	—	—	—	—	—	—	—1.1	—	1. 1. Schiffbeobachtungen
20. Nertschinsk	51 55 n.	111 9 w.	280	—	—5.7	—11.1	—4.1	—17.4	—4.6	—30.6 Jan.	1. 2. 3. neuer St.
21. Hebron, Labrador	58 -	66 - w.	—	—	—5.3	—18.8	—7.7	—6.1	—6.8	—20.7 Febr.	2
22. Yano, Labrador	57 10 n.	61 10 w.	—	—	—3.8	—18.3	—6.1	—7.5	—1.6	—20.6 Jan.	1-5
23. Ft. Simpson	62 11 n.	114 52 w.	40	—	—3.3	—23.3	—2.8	—15.1	—2.8	—21.8 -	1-3; centralis lat. Amerika.
24. Enontekiä	68 40 n.	20 0 ö.	221	—	—2.7	—17.9	—3.9	—12.6	—2.7	—17.9 -	1
25. Tehlik	58 11 n.	62 56 w.	18	—	—2.4	—19.8	—	—11.0	—	—	1
26. Godthaab	54 10 n.	54 2 w.	—	—	—1.9	—10.0	—2.9	—6.9	—0.8	—10.0 Jan.	1-3; unicher.
27. Boguslawsk	59 41 n.	57 06 w.	59	—	—1.6	—19.1	—1.5	—15.7	—2.5	—20.0 Dec.	1-3; 1-3; 3-4; neuer St.
28. Ikrook	52 16 n.	101 58 w.	210	—	—1.1	—17.9	—4.0	—10.0	—2.9	—20.1 Dec.	10. alter St. (Jahreszeit)
29. St. Bernhard	45 50 n.	1 45 w.	1280	—	—1.0	—17.8	—1.1	—19.8	—0.1	—19.0 Jan.	10. auf neuer St. red. in hochf.
30. Bernau	34 19 n.	81 43 w.	60	—	—0.9	—18.6	—0.7	—16.9	—1.3	—21.7 -	5. neuer St.
31. St. Gotthard	46 34 n.	6 14 w.	1055	—	—0.8	—7.6	—2.7	—6.7	—0.9	—8.4 Febr.	10-11
32. Banakylä	60 27 n.	21 27 w.	—	—	—0.5	—11.7	—2.3	—11.4	—0.1	—15.0 Jan.	30
33. Sloup	58 11 n.	35 32 w.	161	—	—0.2	—16.8	—0.1	—13.2	—0.5	—17.2 Febr.	16.1 -
34. Jakobschermaburg	50 48 n.	38 15 w.	128	—	—0.1	—19.5	—0.4	—16.5	—0.1	—16.1 Dec.	18.2 -
35. Fyodorow	55 40 n.	22 0 w.	—	—	—0.0	—6.2	—2.2	—7.7	—1.1	—7.9 -	6-7; neuer St.
36. Nindag	71 10 n.	23 30 w.	—	—	—0.1	—4.6	—1.3	—6.4	—0.1	—5.5 Jan.	1. unicher.

Figure 4: Annual dispersion of heat on the surface of the earth

Monate	Petersburg. (59°56' Br.)	Berlin. (52°31' Br.)	Paris. (48°50' Br.)
Januar	—9.5°	—2.1°	2.1° C.
Februar	—7.5	0.1	4.7
März	—3.7	3.8	6.5
April	2.6	9.2	9.8
Mai	8.7	13.9	11.5
Juni	15.9	17.1	17.0
Juli	17.3	18.5	18.6
August	15.8	17.9	18.4
September	10.5	14.4	15.8
October	5.1	9.8	11.3
November	—0.8	4.1	6.8
December	—5.3	1.3	4.0
Mittel des Jahres	3.9	8.9	10.8

Die Pariser Beobachtungen sind von 1806—1826, die Berliner von Hrn. Mädler, jetzigem Director der Dargpater Sternwarte, angestellt. Die Mittel sind aus den täglichen Extremen hergeleitet, welche dieser Astronom grösstentheils an Thermographen in den J. 1821—1835 beobachtete und auf meine Bitte herrechnet. Aus der Vergleichung dieser drei Hauptstädte, von denen die beiden ersten 27° 57' und 11° 3' östlich von der letzteren liegen, ergibt sich:

Jahreszeiten.	Petersburg.	Berlin.	Paris.
Winter	—7.4°	—0.2°	3.6° C.
Frühling	2.5	8.9	10.2
Sommer	16.0	17.8	18.6
Herbst	4.8	9.4	11.3
Jahr	3.9	8.9	10.8

Figure 5: Isothermal zone from 18.7°C to 0°C

## I. Isothermenzone von — 18.7° bis 0° Centes.

Ort	Nördliche Breite.	Länge von Paris.	Höhe. Toisen.	Mittlere Temp.
Melville-Insel	74.8°	113.1° w.	—	—18.7°
Igloolik-Insel	69.3	84.4	—	—16.6
Ustjansk	70.9	133.4 ö.	—	—16.6
Fort Rowen	73.2	91.2 w.	—	—15.8
Boothia Felix	70.0	94.2	—	—15.7
Nischen-Kolymak	68.5	158.6 ö.	—	—11.2
Jakutsk	62.0	127.4	45	—9.5
Nowaja Semlja	70.6	55.5	—	—8.4
Fort Franklin	73.0	51.5	—	—6.9
Nertschinsk	74.0	52.5	—	—5.7
Godhavn	65.2	125.5 w.	35	—5.5
Nain	51.9	114.1 ö.	290	—3.8
Fort Simpson	69.2	55.7 w.	—	—3.5
Enontekiä	57.2	64.2	—	—3.5
Godthaab	62.2	123.9	40	—2.7
Boguslawsk	68.7	20.0 ö.	223	—1.9
Irkrut	64.2	54.0 w.	—	—1.6
Barnaul	59.7	57.7 ö.	80	—1.1
St. Bernhard	52.3	102.0	210	—0.9
St. Gotthard	53.3	81.7	60	—1.0
Olver-Torneä	45.8	4.7	1280	—0.8
Sloup	46.5	6.2	1075	—0.5
Jakobschermaburg	66.5	21.5	—	—0.2
Fyodorow	55.2	57.5	164	—0.1
Cumberland House	56.8	58.2	128	0.0
	65.7	22.0 w.	—	0.0
	54.0	104.6	125	0.0

[illegible]

Figure 6: Climate of the European and Asian territories of Russia

It is not by chance that the first criticism of the damage inflicted on nature by man first appeared in American literature, and preceded any ecological movement by several decades. One of the first occurrences and classic examples is Herman Melville's *Moby Dick*, which appeared in 1851, eight years after Humboldt's previously mentioned work. This allegorical novel is a treasure trove of various narratives, traditions, mythological, biographical and other motifs, which all reveal the process by which the United States, originally an agrarian state, became an industrialised country through the exploitation of nature. The novel is a polyphony of styles, themes and ideals, much more complex than for us to be able to reduce it to a single underlying idea. However, the majority of interpretations agree that the hunt for the white whale as a metaphor is a large-scale criticism of rational thinking and the change in attitude towards nature (Tarizzo 2012). The whale-hunters regard their prey not as a living creature that is a part of its environment but merely as raw material. The hunt, during which all natural, technical and human resources are utilised, symbolises how economic considerations, the desire to discover and the basic concept of conquering are interwoven with each other, thus becoming the vehicle and driving force behind early globalisation.

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and human conscience. He synthesises the experience of everyday life with the historical teachings of over two thousand years, and at the same time realises that interfering with the order of nature to such an extent will have unforeseeable consequences for humanity.

Poetic interest in nature in the 20<sup>th</sup> century is primarily determined by the awareness of man belonging to nature yet growing ever more detached from it. Joseph Conrad's short story, *The Heart of Darkness* (1899) presents the story of a trade company's expedition in Central Africa. The various stages of their journey appear as the lost watch-posts of a civilisation led by the "corrupt missionaries of development." Kurtz, the ivory merchant, ruthlessly exploits those living under his command, but eventually ends up falling victim to the wild. The symbolic depiction of the rain forest emphasises the metaphoric nature of the work. The main idea of *The Waste Land* (1922), the famous cycle by T. S. Eliot, is the futility of our modern secular world and the need to interpret it. The barren place, as a symbolic landscape, carries a double meaning in the fifth part: on the one hand, we live in a world deserted by God, yet we must cross the waste land to reach salvation. Eliot employs the "unreal" city enshrouded in fog as the symbol of modern life.

A recent ecocritical interpretation by Geoff Berry of the symbolism of light in these two classic texts of the early 20<sup>th</sup> century uncovered the anxieties they reveal about the way the symbol of light is co-opted on behalf of the modernising project of colonising nature and its technologies (Berry s. a.). Colonisation by Western civilisation is inseparable from the aim of mastering the earth, thereby creating ecological devastation in its wake. Conrad and Eliot, who are aware of the gloomy consequences of this dream, recognise the limits of such an agenda of mastery, and experiment with alternative concepts. As Berry points out, both authors "recognise the disconnectedness of a stance that defines the earth as dead or inert matter, which could be con-

trolled and transformed by technologically advanced cultures, in turn eroding the possibilities of a deeper relationship with the natural world for the modernised urbanite. Furthermore, they both see that we suffer from our alienation from nature, [...] and that this alienation will ultimately prove to be self-[...] defeating."

A similar, though less familiar example of ecocriticism is Alfred Döblin's novel entitled *Mountains, Seas and Giants* (1924). The author's original purpose was to set the natural-mystical tendencies of his earlier novels against the successful U-topia of a technologically developed world. Although the novel does present, for the first time in German, a significant vision about the future of a world governed by science and technology, it conveys a hopeless perspective. The novel revolves around the inability of man to control nature, whereas he can survive only by consciously establishing a harmonious relationship. According to the novel, the continuous development of technology will result in huge overproduction by the 24<sup>th</sup> century, which will lead to the disintegration of states and extreme urbanisation of the population. With the invention of synthetic food man's alienation from nature will become complete, a result of which will be the appearance of gigantic humans and mutant combinations of man and plants. Mankind will tear itself apart, and only self-sufficient "settlers" will have any chance of survival. In 1932 Döblin published the second, significantly shortened edition of his work, in which he changed his original concept, and instead of nature takes the side of the degenerate giants. The purpose of this latter version is to present the "historical state of modern humanity", which, as it "wishes to encrust itself within the world of machines is choked by the crust, and can only break the crust with great difficulty."

Criticism of technological development at the cost of destroying nature also gained momentum in post-1945 German poetry. For example, the two most distinct features of Ingeborg Bachmann's poetic oeuvre are the connection between nature and

history, and the portrayal of the devastation wreaked by mankind upon nature through images and metaphors of a severely damaged environment. It is also images of nature that define much of Günter Eich's poetry. However, while in his early poems nature serves as the sphere of magical experience, his post-world war poems depict a ravaged environment. Questioning development and criticising blind faith in technology are the main motifs of Hans Magnus Enzensberger's poem *The Sinking of the Titanic* (1978). Warning against the exploitation of nature in the age of technology is a recurring theme of Günter Kunert's poetry, apparent in the volumes *Remembering a Planet* (1963) and *The Innocence of Nature* (1966), and elsewhere.

From the 1960s onwards discourse on ecology in America was inspired by works such as Aldous Huxley's *Island* (1962) and Ernest Callenbach's *Ecotopia* (1975). In the latter the author connects the Utopian-ecological system of "stable balance" with the proposal for a welfare state. Inhabitants of Ecotopia lead their lives in accordance with knowledge of natural processes grounded in science and the theoretically attainable stability of the ecosystem. Nature is a closed, self-regulating system, the stability of which is maintained by recycling processes. As opposed to the standardising approaches of earlier utopias, Callenbach argues in favour of maintaining the diversity of lifestyles, ethics and traditions. Economic and social structures are determined by the principle of living in balance with nature. Early examples of ecofeminist Utopias include Marge Piercy's *Woman on the Edge of Time* (1976) and Sally Miller Gearhart's *The Wanderground* (1979). In the 1960s and 1970s Archie Randolph Ammons stressed the importance of a poetic dialogue with nature and the need to relinquish control over the environment. The fundamental message of Edward Abbey's utopian novel, *Good News* (1980) is that even ecology cannot save the Western world from total destruction (Heller – Hölbling – Zacharasiewicz 1988).

### III

The issue of climate change and global warming, their possible effects and related human-environment interaction entered English-American literature in the late 20<sup>th</sup> century after sporadic preliminaries; (these include e.g. Jules Verne: *The Purchase of the North Pole*, 1889; Abe Kobo: *Inter Ice Age 4*, 1970, first ed. *Dai-Yon kamyoki*, 1959; J. G. Ballard: *The Wind from Nowhere*, 1961; John Christopher: *The World in Winter*, 1962; James Blish: *We All Die Naked*, 1969; Kurt Vonnegut: *Slapstick or Lonesome No More!* Arthur Herzog: *Heat*, 1977). (The 1930s saw numerous science fiction films centred around apocalyptic, sometimes climatic destruction as metaphorical responses to the widespread economic and political crises of the day.) Some years later German and French literature were also conquered by the theme. All this took place at the same time that the majority of scientists accepted the theory of anthropogenic climate change. The number of related literary works has since risen to several hundred, making it almost impossible to embrace the subject as a whole. For example, the database of the website "Eco-Fiction – Climate change and eco-themes in literature and the arts", a voluntary outreach project run by the small Moon Willow Press, listed in September 2015 326 titles that had been published mainly in the last fifteen years. This number in itself indicates that these books are read by more people than works of non-fiction on climate change, and therefore have to be taken into consideration with regard to environment protection.

Most of the books listed were published by small independent presses, but a few of them were put out by well-known publishing houses, such as Macmillan, Harper Collins, Faber and Faber, Bloomsbury and Penguin Press. The theme has penetrated into popular culture, and besides literature has made its way into films, TV series, visual arts, theatre, pop music and lately video games and comic books (cf. Wikipedia: "Climate change

in popular culture”; goethe.de/klima). Dissertations and other academic works on ecological topics in literature have been written since the 1980s, whereas the systematic investigation of novels focusing on the issue of climate change is rather difficult, as these have only attracted the interest of literary studies more recently (Trexler – Johns-Putra 2011). Only a few such works have been analysed in detail. In Timothy Clark’s *The Cambridge Introduction to Literature and the Environment* the fictional discourse of climate change features as a main topic of the preface (Clark 2011). Some universities now offer climate-change fiction courses that deal with both literature and film (Sommer 2015).

Novels dealing with climate change form a sub-category of ecologically oriented fiction (eco-fiction) that focuses on, or strongly alludes to, a world affected by climate change, usually during and after events that take place when climate variations occur, including the „relational-causal” aspects, and the human consequences. Climate fiction, or cli-fi (the term was coined by climate activist and freelance writer Dan Bloom in 2007) is not a new genre, but a theme in science or speculative fiction that has been around for decades and which is constantly evolving with an ever-increasing number of novels and films. Gregers Andersen suggests reserving the term only for works of fiction of various genres that employ the specific scientific paradigm of anthropogenic global warming in their plot (Andersen 2015). Other terms for climate change novels are solarpunk and anthropocene fiction. Some literary critics speak of cli-fi as a separate genre or a sub-genre of science fiction (Mehnert 2014).

The stories are often written with a moral or political imperative to warn society about the human impact on nature. Imaginative narratives about climate change occupy a wide range of genres. Climate themes are commonly found in science fiction, dystopian fiction, literary fiction, speculative fiction and fantasy, but can also be seen in novels dealing with romance, suspense, thriller, adventure and the like. These themes appear in chil-

dren’s literature, juvenile and adult fiction as well. There is also a host of post-apocalyptic adventure novels aimed at young-adult readers. Climate-themed stories can either be earlier science fiction tales based on imaginary ideas about natural or sudden climate changes, or modern stories based on understandings of current, scientifically proven, human-caused climate change. These stories include scenes of the world’s most climatically vulnerable regions. Mythological and Biblical themes, the amplification and re-functionalisation of the literary topos *locus terribilis*, apocalyptic scenarios, the imagery of social breakdown, fragments of traditional narratives and popular narrative motifs are frequently used in the plot. Popular motifs include varying degrees of climate-change-induced destruction, the downfall of mankind, war, the struggle of an individual, couple or community as they face the forces of nature, the ruins of society or a new civilisation. Questions are often raised about the responsibility of the individual, society and leaders, the reinterpretations of values, adaptation to new circumstances, change in human character, solidarity and the role of technology. Cli-fi reflects on how humans interact with each other, as well as how non-human nature is to be respected, and preserved (Kunkel 2014). As in other genres of prose, besides inventiveness, authors’ understanding of science and the humanities, together with insight into history and psychology, is crucial.

As a form of conceptualisation of environmental danger, cli-fi is one of the hottest reading trends in our times, but climate change is far too complex an issue for a single definitive novel. The aesthetic value of associated works is extremely varied; only a few of them are better than average. Cli-fi novels as influential as George Orwell’s 1984 or Aldous Huxley’s *Brave New World* are yet to be written. Climate change has not yet inspired works of literature that adequately reflect on this challenge of historic proportions. The international reputation of books is often guaranteed not by their literary quality but by marketing and the climate industry.

Many of them have received prestigious literary awards, like for example, Patrick Ness's *The Knife of Never Letting Go* (2008), Ian McEwan's *Solar* (2010) and Paolo Bacigalupi's *The Water Knife* (2015). Several books have been translated into many languages, like for example, Michael Crichton's *State of Fear* (2004), Sophie D. Crockett's *After the Snow* (2012), Karen Dionne's *Freezing Point* (2008), Antti Tuomainen's *The Healer* (2013, first ed. *Parantaja*, 2010), Barbara Kingsolver's *Flight Behaviour* (2012) and Nathaniel Rich's *Odds Against Tomorrow* (2013). A few of them have been adapted for the screen, like for example, David Mitchell's *Cloud Atlas* (2004). Some have received positive reviews in distinguished newspapers, like *Time* magazine, the *Guardian*, *The Financial Times* and *The New York Times*. Many have a separate entry in Wikipedia. Among the authors we can find not only writers from the literary mainstream, but also debutants, journalists and scientists. Time will tell which pieces will lose their relevance or prove to have a lasting effect. The best novels weave together the emotional, rational and moral threads, and provide us with new ways of seeing nature and our place in it.

There is plenty of rhetorical and narrative potential in the representation of the risk global climate change poses. Some cli-fi novels establish new connections between local, national and global forms of awareness by the use of innovative aesthetic forms combining epic, allegory and views of our planet as a whole, employing techniques of montage, fragmentation, collage and zooming. A number of prominent novels have recently depicted climate change or associated phenomena, such as rising sea levels and global warming. These include, for example, Margaret Atwood's *Oryx and Crake* (2003), Will Self's *The Book of Dave* (2005) and Kim Stanley Robinson's *Science in the Capital* trilogy (*Forty Signs of Rain*, 2004; *Fifty Degrees Below*, 2005; *Sixty Days and Counting*, 2007). One possible appeal in representations of climate change lies in the way in which the climatically changed world of a distant future is depicted. A lot of cli-fi novels are

highly sophisticated and deeply rooted in science. They focus on the more subtle, early impacts of climate change, on the lives of scientists, activists and others working on climate-related challenges, or on how life will change for ordinary people in the future. Climate change scenarios sometimes merely serve as a background for other themes and situations. Similar to global warming dramas from Hollywood, authors like Michael Crichton dismiss climate change as exaggerated, misleadingly claiming it to be a hoax propagated by environmental activists, and tries to relieve mankind of its responsibility.

In Robinson's aforementioned trilogy, the representation of climate change appears as a complex set of compromises within the generic space of Utopian science fiction (Johns-Putra 2010). Robinson does not simply establish a future, climatically changed novelty; instead he determines its status in universally challenging and self-reflecting ways. He presents a scenario of an abrupt climate change in the near future; the catastrophe is told from the perspective of a group of scientists and political advisors in Washington DC. The trilogy presents us with no obvious hero, and the action incorporates current scientific research. The imagined paradigm of a society that does not yet exist supplies a cognitive map of what does exist. The moral of the trilogy suggests that only science and politics together can save the day. The overall experimentation and mixing of espionage thriller and political romance is provocative and intentional. Robinson's representation of a world affected by climate change is, as Adeline Johns-Putra pointed out, "a sophisticated revision of generic habit and habitat, a re-imagining of the world-building impulse that characterises science fiction."

The assumption that anthropogenic global warming will, in the future, result in extreme disintegration and human violence on a large scale appears not only in a number of works of popular science, but also in several contemporary climate fictions, like for example, Marcel Theroux's *Far North* (2009), Steven

Amsterdam's *Things We Didn't See Coming* (2009) and Helen Simpson's *A Diary of an Interesting Year* (2010). In Simpson's short story, the Biblical narrative of Babel is one of the templates that lends itself to imagining a future climatically changed world (Andersen 2015). Humanity's progress is set into reverse by its own scientific and technological abilities, as industrialisation first leads to global warming and then sets into motion a world wherein climate refugees, incapable of communicating, are engaged in a constant struggle for survival. This imaginary world faces rather grim prospects, to say the least.

A lot of contemporary cli-fi authors depict a different world affected by climate change, one that we can call the world of the Last Judgment (e.g. Frank Schätzing: *The Swarm*, 2004). However, what is new compared to the ancient imagery of the Last Judgment in contemporary cli-fi is that here it is no longer God, but rather the non-human world, "Nature" itself that acts as both judge and executioner (Andersen 2015). This notion obviously stems from James Lovelock's controversial Gaia theory, according to which our planet is a self-regulating organism capable of even endangering mankind in order to preserve itself. This idea of the Last Judgment appears in a number of products of Western popular culture, and forms part of a dominating repertoire of narrative templates applied in the imagination of anthropogenic climate change.

For my last example I would like to turn to German science fiction, namely Dirk C. Fleck's novel *Maeva!* (2011), a sequel to his work *The Tahiti Project* (2008). With strong journalistic dimensions, the novel shows the multi-faceted and complicated relationship between local and global actions in a future world affected by global warming (Mehnert 2012). Fleck refers directly to existing political institutions, condemns current renewable energy projects, and presents a nuanced picture of a climatically changed world, in which the expansion of renewable energy cannot serve as the only solution to the problem. According to Fleck a

more balanced approach, a life in greater harmony with nature could become part of a solution to the impending environmental crisis. The World Wide Web and digital media play a decisive role in the novel and feature as important tools for ensuring a global perspective. As Antonia Mehnert pointed out, this cli-fi "is meant to serve as a nodal point at which the readers reflect on the narrated future outcomes, and re-consider their own way of life. It thereby contributes to an understanding of climate change as a magnifying glass for the long-term implications of our short-term choices, and as a mirror to re-consider what we really want to achieve for ourselves." The scenarios that Fleck develops explore the diverse environmentalisms and eco-political reactions to escalating crises in a climatically changed world, while at the same time emphasizing the cultural contexts that not only constitute but also constrain these developments.

## IV

### Conclusions

1. Alexander von Humboldt was one of the first to raise awareness of the importance of climate change caused by mankind. The understanding of nature as an organic entity, Humboldt's concept of the balance and interaction of forces within nature, the relationship between man and nature, and regarding science and the humanities as a single unity are all notions worth taking into consideration in our times, since they might help us establish a mutually favourable relationship with nature and encourage a creative approach to environment protection.

2. Today there are no irrefutable arguments against the theory of anthropogenic climate change. Future discussions are likely to revolve around the options of accommodation, possible preventive measures for the avoidance of a situation even more threatening than the present, and the relationship between growth and climate

protection. Ten years ago the Stern Report revealed that global climate protection could be achieved for less than one percent of the world's gross output.

3. Climate change is a cultural change, and climate literacy is more than just understanding climate science. It is about understanding the social, cultural and human dimensions of climate change. It is about grappling with the impacts of climate change on our minds and emotions, and also the ethics of climate change. Thinking and writing about nature and the climate requires all the subtlety, and sophistication writers can muster (North 2012; Raglon – Scholtmeijer 2013).

4. In the 21<sup>st</sup> century, ecological humanities have been responsible for showing the way industrialisation has mobilised environmentally damaging practices over recent centuries (Iovino 2013). In order to understand global warming, we should not only consider its scientific explanations, but also see it within a broader network of discourses and social practices. In good literature especially, we can find innovative approaches to the topic. Literary studies can make a significant contribution to the rapidly evolving debate on climate change and climate protection (Vasak 2007).

5. Once the image of man conquering nature has finally been shattered, it is time to heed the warnings of historical ecology, and listen to what writers and poets say about how man's relationship with nature has changed in the past, about traditional strategies concerned with protecting forests and waters, that is our climate, about current developments in climatic and hydrological conditions, about ruining our environment and the fact that this is irreversible.

6. Besides the scientific, technological and economic approaches to climate change, it is necessary to incorporate the ethical dimension, together with the considerations of social sciences and cultural studies. Interpreting changes and methods of addressing these problems might vary considerably in

relation to culture and ideology. The best climate change novels call for a new perspective when tackling global, regional and local questions which do not fit into national politics. Literary studies may explore several unknown aspects of the cultural dynamics of climate change and climate protection.

7. It is widely known that climate change greatly influences the global hydrological cycle and regional sub-cycles. Various works of fiction show that climate change and issues of water supply deserve attention in order to prevent potential disasters and conflicts as a result of water shortage and rise in sea levels.

8. Forecasting and envisaging future anthropogenic global warming cannot solely be a matter for scientific investigation. It is also a culturally constructed phenomenon, as the new is perceived through the cognitive schemes of the old in a process of dialectical adjustment.

9. While the effects of former eco-catastrophes were often clearly visible, the effects of global warming seem hard to grasp. There is a significant knowledge gap between the familiar preoccupations of everyday life and the abstract future of a climatically changed world. Good cli-fi is important because it goes beyond abstract predictions and statistics to show the reality of a possible future, and render visible, personal and tangible that which is as yet unimaginable. For many people it provides stronger motivation to act and to show consideration than looking at scientific data might do (Schneider 2010).

10. Contemporary climate fiction emphasizes the end of the idea that the non-human world is a God-given pond for human mastery, and helps us to go beyond the destructive divide between Nature (written with a capital n) and society. It helps us to perceive the world as a whole, and stimulates an understanding of global interconnectedness and attention to human and non-human, natural and cultural places.

11. Cli-fi helps to explore the reasons for climate change denial and its implications, including wishful thinking, ideology, con-

sumer culture and active lobbying by the fossil fuel industry. It might help to change the reader's outlook as far as global warming is concerned. A further contribution to climate protection may be to persuade mankind to take care of the environment and change its actions now.

12. Good climate fiction is a powerful critical lens: a way to focus on what the future might hold, a way in which we can view global warming and its possible consequences if we do nothing to stop it. It nestles in our minds and urges us to consider other perspectives and adopt new solutions. The best cli-fi novels make us think deeply about the human side of climate change: they raise new questions about what it means not only to survive, but to be human and take responsibility.

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