

Uncorrected pageproofs.

1 Genocide

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5 Definition

6 By combining the Greek *genos* (a people, tribe, race) and the Latin *cide* (to kill), Raphael Lemkin (1944,
7 p. 79) invented the word genocide. Article 2 of the 1948 United Nations (UN) Convention on the
8 Prevention and Punishment of the Crime of Genocide defines *genocide* as “any of the following acts
9 committed with intent to destroy, in whole or in part, a national, ethnical, racial or religious group, as such:
10 (a) Killing members of the group; (b) Causing serious bodily or mental harm to members of the group;
11 (c) Deliberately inflicting on the group conditions of life calculated to bring about its physical destruction
12 in whole or in part; (d) Imposing measures intended to prevent births within the group; (e) Forcibly
13 transferring children of the group to another group” (United Nations 1948). As of 31 October 2014, only
14 146 UN members are Party to the Convention.

15 Data, Mass Atrocity Crimes, and Institutions

16 Data

17 In a summary of large-sample datasets on atrocities involving civilians, Anderton (in Anderton and Brauer
18 forthcoming; henceforth “in A/B forthcoming”) identifies 202 distinct cases of state-sponsored genocides
19 and mass atrocities (GMAs) from 1900 to 2013, 42 state-perpetrated genocides from 1955 to 2013, and
20 35 GMAs perpetrated by non-state groups from 1989 to 2013. Some well-known genocides include the
21 Armenian genocide (1915–1918; estimated fatalities ~1.5 million), the Holocaust (1933–1945; ~10
22 million), Cambodia (1975–1979; ~1.9 million), Rwanda (1994; ~0.8 million), and Sudan-Darfur
23 (2003–2011; ~0.4 million). A cautious estimate of intentional civilian fatalities associated with the
24 202 state-perpetrated GMAs since 1900 is 84 million. Less well-known are non-state perpetrated
25 atrocities such as conducted by the so-called Islamic State, with estimated fatalities of 8,198 from 2005
26 to 2013 (see Uppsala Conflict Data Program at <http://www.pcr.uu.se>).

27 Mass Atrocity Crimes

28 As defined in the UN Convention, *genocide* is the intentional destruction, in whole or in part, of a specific
29 group of people. In non-genocidal *mass killing*, perpetrators do not seek to destroy a group as such (Waller
30 2007, p. 14). *Crimes against humanity* encompass widespread or systematic attacks against civilians
31 involving inhumane means such as extermination, forcible population transfer, torture, rape, and disap-
32 pearances. *War crimes* are grave breaches of the Geneva Conventions including willful killing, torture,
33 willfully causing great suffering or serious injury, and extensive destruction and appropriation of property.
34 *Ethnic cleansing* is the removal of people of a particular group from a state or region using means such as
35 forced migration or mass killing (Pergorier 2013). *Violence against civilians* (VAC) can incorporate mass
36 atrocities but it also includes incidents that are relatively small, specifically, less than 1,000 per case or per

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37 year. Along with genocide, crimes against humanity, war crimes, and ethnic cleansing are both legal and
38 scholarly terms.

39 At the Nuremberg trials of 1945–1946, the International Military Tribunal found none of the accused
40 guilty of crimes committed prior to the outbreak of war on 1 September 1939; litigation was limited to
41 atrocities during wartime (Schabas 2010, pp. 126–127). Lemkin's (1944) and the UN's conceptions of
42 genocide were novel precisely because they spoke to criminal acts committed in wartime or in peacetime.
43 Nevertheless, the UN definition of genocide has been subject to critical scrutiny by scholars, for instance
44 in regard to groups left out (e.g., political), how to identify "intent," the inability of the Convention to
45 prevent genocide, the relationship of genocide to other atrocities, and misuse of the term (e.g., Curthoys
46 and Docker 2008). The UN definition of genocide has not expanded since 1948 to include other groups,
47 but international criminal law has evolved. Schabas (2010, p. 141) maintains that the expanded concept of
48 crimes against humanity has "emerged as the best legal tool to address atrocities" and "genocide as a legal
49 concept remains essentially reserved for the clearest cases of physical destruction of national, ethnic,
50 racial, or religious groups."

51 International and Domestic Institutions

52 The twentieth and twenty-first centuries display the emergence and growth of international and domestic
53 laws designed to prevent, punish, and/or foster restitution for atrocity crimes. Table 1 shows a selection of
54 such institutions as well as sources that provide further information. Adjudication of mass atrocity crimes
55 began in earnest following World War I with the establishment of the Turkish Military Tribunal (TMT)
56 (1919–1920), which prosecuted organizers of the Armenian genocide. The trials, characterized as "a
57 milestone in Turkish legal history" (Dadrian 1997, p. 30), revealed the systematic planning behind the
58 genocide, enrichment of perpetrators through looting of victims' assets, and the lack of military necessity
59 for the forced relocation of Armenians. However, the TMT convicted only 15 men among the hundreds
60 who orchestrated the genocide (Dadrian 1997).

61 Following World War II, the International Military Tribunal (IMT) at Nuremberg was established in
62 which leading officials were tried for war crimes and crimes against humanity (1945–1946). Twelve Nazi
63 leaders received the death sentence and many others were given long jail terms. The trials had an
64 important influence on the growth of international criminal law including the 1948 Genocide Convention,
65 the International Criminal Tribunal for the Former Yugoslavia (ICTY) established in 1993, the Interna-
66 tional Criminal Tribunal for Rwanda (ICTR) established in 1994, and the International Criminal Court
67 (ICC) ratified in 2002. As of August 2014, the ICTY had indicted 161 people for atrocity crimes
68 associated with the wars in the former Yugoslavia in the 1990s. As of September 2014, the ICTR had
69 indicted 95 people for atrocity crimes associated with the 1994 civil war and genocide and it established
70 the legal precedent that mass rape during wartime is genocidal. Following the huge backlog of cases
71 awaiting trial in Rwanda, the government turned to the Gacaca court system, based on traditional law
72 developed within communities (Bornkamm 2012). As of October 2014, the ICC has indicted 36 individ-
73 uals for atrocity crimes including three current or former heads of state: Omar al-Bashir (Sudan), Uhuru
74 Kenyatta (Kenya), and Laurent Gbagbo (Côte d'Ivoire). According to its Statutes, the ICC has jurisdiction
75 with respect to genocide, crimes against humanity, and war crimes.

76 Another important international genocide development occurred at the 2005 UN World Summit, in
77 which member states unanimously adopted a norm known as the *Responsibility to Protect* (R2P). R2P
78 was part of the impetus for UN Security Council Resolution 1973, passed on 17 March 2011, which
79 authorized member states to take actions, including enforcement of a no-fly zone, to protect civilians from
80 attacks by the Libyan military. Nevertheless, the UN's R2P resolution has no legal force
81 (UN Doc. A/RES/60/1, paras 138, 139).

t1.1	Table 1 Selection of legal institutions, jurisprudence, and international norms related to genocide prevention and post-genocide justice	
t1.2	Selection of legal institutions (or norms)	Selection of sources for further information
t1.3	International	
t1.4	International Military Tribunal at Nuremberg (IMT) (1945–1946)	US Holocaust Memorial Museum (http://www.ushmm.org)
t1.5	Convention on the prevention and punishment of the crime of genocide (1948, 1951)	United Nations (https://treaties.un.org), Schabas (2010), US Holocaust Memorial Museum (http://www.ushmm.org)
t1.6	International Criminal Tribunal for the former Yugoslavia (ICTY) (1993)	United Nations (http://www.icty.org)
t1.7	International Criminal Tribunal for Rwanda (ICTR) (1994)	United Nations (http://www.unictt.org)
t1.8	International Criminal Court (ICC) (2002)	International Criminal Court (http://www.icc-cpi.int)
t1.9	Norms on the responsibilities of transnational corporations and other business enterprises with regard to human rights (2003)	Hillemanns (2003)
t1.10	Extraordinary Chambers in the Courts of Cambodia (ECCC) (2003)	Extraordinary Chambers in the Courts of Cambodia (http://www.eccc.gov.kh/en)
t1.11	Responsibility to Protect (R2P) (2005)	United Nations (UN A/RES 60/1 www.un.org/Docs); ▶ http://www.un.org/en/preventgenocide)
t1.12	Domestic	
t1.13	Turkish military tribunal (1919–1920)	Dadrian (1997)
t1.14	US Alien Tort Claims Act (1789, 1980)	Michalowski (2013)
t1.15	Prosecution of civilian atrocities (not necessarily genocide) in domestic courts (includes Nuremberg and others)	Schabas (2003), Prevent genocide international (http://www.preventgenocide.org)

82 Following the Nuremberg trials and the UN Convention, several dozen nations have developed
 83 domestic laws to put on trial suspected Nazi war criminals and/or perpetrators of more recent atrocities
 84 (Schabas 2003). For example, in 2000 the Chilean Court of Appeals lifted former President Augusto
 85 Pinochet’s immunity from prosecution, paving the way for trial for his role in civilian atrocities that
 86 occurred during his leadership (Pinochet died prior to any conviction). The case is notable not only
 87 because it involved a state’s prosecution of its former leader, but also because Pinochet’s initial arrest
 88 occurred in London based on an application of “universal jurisdiction” by European judges. Universal
 89 jurisdiction is a principle by which a state (or states, in the Pinochet case) asserts its right to prosecute a
 90 person for an alleged crime regardless of the crime’s location and the accused’s residence or nationality
 91 (Lunga 1992).

92 Not shown in Table 1 are formalized norms within for-profit and non-profit organizations designed to
 93 inhibit complicity in atrocities. The ICC followed the ICTY and ICTR in having jurisdiction only over
 94 “natural persons” and not “legal persons” (Cernic 2010, p. 141), which ruled out prosecution of
 95 corporations complicit in genocide (individual agents within corporations can be tried). Multinational
 96 corporations have been complicit in genocide in many cases, but have not usually faced prosecution
 97 (Kelly 2012). Nevertheless, there have been legal efforts, including use of the US Alien Tort Claims Act,
 98 to bring litigation against corporations for alleged complicity in atrocities and other human rights abuses.
 99 Such litigation is leading companies to develop norms to avoid such complicity (Michalowski 2013).

100 **Theoretical and Empirical Aspects**

101 This section asks: What are (some of) the risk factors that economic theory and associated empirical work
102 point to, i.e., what makes the risk nonzero ($r > 0$)? The section thereafter asks: How can genocide risk be
103 reduced below 1 ($r < 1$)?

104 **Theoretical Perspectives**

105 Formal economic models of genocide are relatively new in the literature on conflict, peace, and security
106 between and within states. Verwimp (2003), Ferrero (2013), Anderton and Carter (forthcoming), and
107 Anderton and Brauer (in A/B forthcoming) present nonstrategic constrained optimization models to
108 highlight conditions under which a political authority would choose genocide as part of its goal of
109 controlling territory or government (or both). The models reveal conditions in which genocide has a low
110 opportunity cost for the authority, specifically, when genocide enhances the authority's control in the
111 context of crisis or war, is not too disruptive to economic activities (e.g., trade), is conducive to looting
112 victims' wealth, and is not likely to generate third-party intervention. Under such conditions, genocide is
113 "cheap," and a positive amount demanded can exist. Genocide prevention requires that the opportunity
114 cost of genocide is made high through sanctions, credible threats of third-party intervention to help
115 victims and/or oppose authorities, threats of prosecution, and surveillance of atrocities which can lead to
116 "naming and shaming" of perpetrators. In addition to modeling genocide risk factors, Anderton and
117 Brauer (in A/B forthcoming) use a Lancaster household production model to study the "optimal" choice
118 of genocidal techniques (e.g., mass killing, starvation, forced relocation, etc.) by a regime that has already
119 chosen genocide. Among the results is a "bleakness theorem" in which protection policies along one or
120 just a few dimensions have relatively little overall effect, and sometimes no effect, in protecting victims.

121 Game theory models of genocide consider strategic interactions between warring groups and/or
122 between an oppressive in-group and an out-group in which intentional destruction of civilian groups is
123 part of war tactics or strategy. For example, Azam and Hoeffler (2002) identify conditions in which
124 warring sides use violence against civilians to strengthen themselves in their strategic interaction.
125 Focusing on the years preceding the 1994 Rwandan genocide, Verwimp (2004) develops a four-player
126 game to model the strategic interactions among the regime, the domestic opposition, a violent rebel group,
127 and the international community. Within the game, eliminating the moderate Hutu opposition and
128 exterminating the Tutsi can be "optimal" strategies. Anderton (2010) draws upon the bargaining theory
129 of war to show how severe threat against an authority group or an incentive to eliminate a persistent rival
130 can lead to genocide as an "optimal" choice. Anderton (2010) and Gangopadhyay (in A/B forthcoming)
131 use evolutionary game theory to model how genocide can become socially contagious (acceptable)
132 among "ordinary people." Vargas' (in A/B forthcoming) model of contestation between a government
133 and a rebel group reveals the incentives of each to side to kill the civilians who are supporting the enemy.
134 Within the model, Vargas finds that the strengthening of either side can have ambiguous effects on the
135 total number of civilians killed, thus showing that third-party support for one side or the other can
136 potentially increase civilian killing. Esteban et al. (forthcoming; in A/B forthcoming) inter-temporal
137 models of contestation between a government and a rebel group reveal several important and sometimes
138 counterintuitive results. In particular they find that new discoveries of resources, democratization of the
139 polity, and third-party intervention to defend vulnerable civilians can enhance incentives for mass killing
140 if they materialize under the "wrong" conditions.

141 The lessons of constrained rational choice and game theory models for thinking about the emergence of
142 laws designed to punish and prevent genocide are critical. Laws that come into being will be evaluated by
143 potential perpetrators of genocide as part of the constraint set being faced. Such agents, if determined to
144 carry out genocide, have an extensive menu of inputs for working around such laws to achieve objectives.

145 Laws to punish or prevent genocide must consider the multiple options available to potential perpetrators
146 and the potential for laws to lead to unintended consequences. This concern is especially significant in the
147 context of strategic interplay between a government, rebel organization, and possible third-party inter-
148 venter. If not carefully designed, law to prevent and punish genocide can serve to increase incentives for
149 atrocities. (On the design of law, see the next section.)

150 Perspectives from behavioral economics also help to study genocide (e.g., Anderton and Brauer;
151 Slovic, Västfjäll, and Gregory, both in A/B forthcoming). Especially important is the reference-dependent
152 objective function of one or a few leaders who have become accustomed to control of political, economic,
153 and/or territorial goods. Experiments in behavioral economics often find evidence of *loss aversion*, in
154 which, relative to a reference point such as current hold on power, subjects believe they are worse off from
155 a loss than a similar gain leads them to feel better off. The notion of loss of power as a form of extreme
156 crisis or existential threat in the minds of leaders is palpable in many genocide case studies (Totten and
157 Parsons 2013). Such losses, coupled with the behavioral phenomenon of loss aversion, suggest that
158 leaders could make extreme choices including repressive violence or genocide to avoid loss (Midlarky
159 2005, pp. 64–74).

160 Empirical Perspectives

161 About 30 published large-sample cross-country empirical studies of genocide or other forms of VAC risk
162 or seriousness exist (see Anderton 2014; Anderton and Carter forthcoming; and Hoeffler in A/B
163 forthcoming). Most of these focus on genocide risk or severity from the perspective of *countries*, and
164 thus they focus on the problem of genocide from the “macro” or top-down perspective. Another branch of
165 empirical genocide literature focuses on particular countries, regions, or locales in which genocide took
166 hold and spread, thus emphasizing a “micro” or bottom-up perspective. While almost all of the empirical
167 studies of genocide in the literature focus on risk or seriousness based on historical data, studies are
168 emerging with an emphasis on forecasting (e.g., Rost 2013; Butcher and Goldsmith in A/B forthcoming).

169 The most prominent macro-empirical study of genocide risk in the literature is by Harff (2003), who
170 focused on a sample of states that experienced “state failure” (e.g., civil war, regime collapse) from 1955
171 to 1997. Of 126 state failures in the sample, 35 led to genocide. Conditioned on state failure, Harff used
172 logit analysis to identify six significant risk factors for genocide onset: magnitude of political upheaval;
173 history of prior genocide; exclusionary ideology held by the ruling elite; autocratic regime; ethnic
174 minority elite; and low trade openness. Failing to make the list of significant risk factors was economic
175 development, which Harff proxied by infant mortality. Another important macro-empirical study of mass
176 atrocity risk is Easterly et al. (2006), who assemble a dataset for many countries for the period 1820–1998.
177 Among their key results, they find that mass atrocity is significantly less likely at high levels of democracy
178 and economic development, in which the latter was proxied by real income per capita.

179 Regarding potential *economic* risk factors for genocide, subsequent empirical research suggests that
180 Harff’s result for trade is not robust with most studies reporting no significant impact of trade on atrocity
181 risk. In addition, Harff’s result on economic development is open to question because an inverse
182 relationship between real income per capita and atrocity risk or seriousness is one of the few modest
183 empirical regularities in the literature. Other economic risk factors considered in the empirical literature
184 are income inequality and resource dependence, in which no empirical regularities have yet emerged, and
185 *economic* discrimination, which is only beginning to be considered but in which two studies report a
186 significant positive effect on genocide risk (Rost 2013; Anderton and Carter 2014). In the emerging
187 empirical forecasting literature on genocide, no clear results as yet stand out in regard to the roles of
188 economic variables. In their survey of such literature, Butcher and Goldsmith (in A/B forthcoming)
189 suggest that “while economic factors might have an underlying causal effect on the likelihood of

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190 genocidal violence in a society, as predictors in forecasting models they might be overshadowed by
191 political or demographic factors that are more proximate to genocide onset.”

192 In addition to large-sample, macro-empirical studies of genocide risk or severity are country-specific,
193 micro-empirical studies that focus on particular characteristics of a nation, region, or individuals that led
194 to the onset or spread of atrocity (e.g., Ibañez and Moya in A/B forthcoming; Justino in A/B forthcoming).
195 Country-specific studies typically identify historical, social, and economic conditions particular to the
196 country and tactical and strategic aspects of war that are critical for understanding atrocity. Such finer-
197 grained elements can be glossed over in large-sample cross-section studies. For example, Ibañez and
198 Moya’s (in A/B forthcoming) study of Colombia reveals many dynamic, nuanced, and interrelated aspects
199 of community and household incentives for civilians to flee violence, why some do not flee, and why
200 contesting military forces (government, militias, rebels) tactically and strategically kill and/or force the
201 relocation of civilians. Such complexities are obviously critical in considering laws to reduce risks of
202 future civilian atrocities, but also in prosecuting perpetrators and designing reparations in post-genocide
203 settings.

204 Economics of International Law

205 Despite some cases of GMA having been brought to trial in national and international courts or
206 tribunals – the Armenian trials in Turkey, the Nuremberg trials, the Pinochet case, and more recent
207 tribunals regarding Cambodia, Rwanda, and the Balkan wars of the 1990s – the overall record of reducing
208 the risk of GMA to below certainty ($r < 1$) is only mildly encouraging. There are several reasons for this.
209 First, even assuming away issues of ignorance and apathy, as a matter of *economics*, unilateral action runs
210 into the problem of sufficient scale and multilateral, collective action into issues related to strategic
211 behavior, free-riding, coordination, agency, benefit appropriation, and cost shifting. Even assuming that
212 none of these pose a problem, all options rely on the existence of well-codified and well-functioning
213 regimes of national and international law and their enforcement. Second, as a matter of *law*, then, reducing
214 GMA risk is difficult because (a) state sovereigns are cautious to accede to any international treaty that
215 may later expose them to legal liability in the first place and (b) because state sovereigns generally do not
216 cede jurisdiction over nonstate GMA actors to international bodies (e.g., Nigeria maintains jurisdictional
217 prerogative over Boko Haram; and if a nonstate actor prevails in an internal conflict it may not be brought
218 to justice at all). And third, as a matter of *institutional design*, these topics bring up questions, to echo
219 Oliver Williamson (1999), as to what kind of bad GMAs are in the first place and, correspondingly, what
220 kind of good GMA-related laws are, and how to best supply them.

221 On the demand (or usage) side, are GMA and GMA-related law private (excludable and rivalrous),
222 public (nonexcludable, nonrivalrous), club (excludable, nonrivalrous), or common-resource pool
223 (nonexcludable, rivalrous) bads or goods, or some changing mixture thereof? And on the supply side,
224 are they best provided by private or public actors, or some changing combination of the two, and what is
225 the technology of their production (e.g., best-shot, weakest-link, aggregate effort, or variants thereof)?
226 What sort of issues in agency, transaction costs, and institutional design arise? While a considerable global
227 public goods (GPG) literature has sprung up in economics (e.g., Kaul and Conceição 2006 and literature
228 cited therein), application to the design of international law as an instance of GPGs is thin in general and
229 almost entirely absent in regard to law and GMA (see, e.g., a recent symposium of papers in the European
230 Journal of International Law, 23(3), 2012).

Q3

231 As regards GMAs, we suggest that indiscriminate chemical weapons gasing may be conceptualized as a
232 *public bad* for the affected population if it is neither feasible to exclude oneself from the gasing nor
233 feasible to seek effective shelter (there can be no rivalry for shelter if there is none to be had). Those who

234 do manage to crowd into a shelter, however, partake in the benefit it offers, the shelter being a common-
235 resource pool good, while those left behind on the street suffer a *common-resource pool bad*
236 (nonexclusionary but rivalrous). In contrast, genocide would be a *club bad* precisely because its architects
237 differentiate and select victims. Finally, examples of a *private bad* suffered in violent conflict include
238 un-orchestrated rape in war or the death of a soldier in the performance of his or her duties (the “expected”
239 bad in war, but not a war crime). Similarly, in regard to the good that GMA-related law may provide,
240 international law of war is intended as a GPG in that all soldiers share in the benefits the law provides and
241 none of them are excluded. In contrast, national law is private to the state whose legislative body passes it:
242 It excludes nationals of other states and reserves benefits to its own nationals. But all international law is
243 effectively a club good, benefitting those who accede, and becomes a pure GPG if and only if *all* states
244 become Party to the treaty in question. In practice, however, it is conceivable that benefits can be withheld
245 so that the benefits law offers become rival to those with the means to access its provisions when needed.
246 Thus, while the Genocide Convention is (not quite) a global public good in principle, the evident practice
247 of “too little, too late” suggests that its enforcement is rivalrous and therefore constitutes a common-
248 resource pool good.

249 Even this cursory “walk around goods space” (Brauer and van Tuyll 2008, Chap. 8) suggests that the
250 good (or bad) in question can take various forms and that each may change across geographic space and
251 time. Neither the goods nor the bads are necessarily unitary (of a single form), and to conceive of GMA
252 simply as a global public bad requiring a global public good response may be inadequate. Moreover, as
253 Shaffer (2012) points out, international laws can be rivalrous to each other and their construction is
254 designed, in part, to trade off against multiple national laws (legal pluralism).

255 In addition, economically efficient (no under- or overprovision) GMA-law in response to GMAs may
256 depend on the summation technology of GMA production. Applying Hirshleifer’s (1983) insight, that
257 some GPGs are best provided as best-shot products (the single-best effort suffices; no need for anyone else
258 to contribute to its provision), weakest-link products (the weakest provider limits the good’s effective-
259 ness), or aggregate effort products (the more is provided by all, the better for all), Shaffer (2010; esp.
260 Table 2, p. 690), argues that best-shot GPGs are best dealt with in global administrative law, weakest-link
261 GPGs by fostering legal pluralism, and that only aggregate effort GPGs may require a global constitu-
262 tionalist approach. To illustrate, when a single country has effectively become the world’s only super-
263 power to intervene in other states’ (GMA or GMA-alleged) affairs, it may be tempted to overreach or
264 under-reach according to its own cost-benefit calculated perception of its Responsibility to Protect,
265 regardless of the wishes of all other UN members. But superpower intervention or nonintervention solely
266 at its own discretion challenges global legitimacy (the US is often accused in this regard; France, in
267 regional interventions, less so). Such situations, Shaffer (2010) argues, are best dealt with by global
268 administrative law which might hold the “incumbent” of the superpower “office” responsible for its
269 actions. We imagine (since Shaffer does not address GMA), that instead of a Genocide Convention, there
270 might exist an UN-approved automatic trigger obligating the superpower to intervene in cases of GMA,
271 subject to global administrative law. As of this writing, little has been theorized in this regard.

272 An additional issue pertains to transgenerational global public goods. Again, this is insufficiently
273 theorized but probably of great importance in cases of GMAs since each event carries significant
274 generational implications (for a review see, e.g., Ibañez and Moya in A/B forthcoming). For public
275 goods provision, Sandler (1999) speaks for four levels of awareness rules: First, the myopic view
276 considers making a marginal cost (MC) contribution to the provision of a GPG only up to the sum of
277 the marginal benefits (MB) a state estimates for its own current generation, $MC = \sum MB$. Second, although
278 still selfish, a forward-looking view is to include one’s own offspring generations, i , such that
279 $MC = \sum MB_i$. Since the expected benefits are larger, this translates into greater willingness to make a
280 larger MC contribution. Third, a more generous view of the benefits summation includes other states’

281 populations, j , but only for the current generation ($MC = \Sigma MB_j$). The most enlightened view of all – we
282 call this the “Buddha rule” – sums the expected benefits across all generations across all populations,
283 $MC = \Sigma MB_{ij}$. Since such benefit is likely to be large, it justifies correspondingly large outlays.

284 Finally, design criteria for GPG that would take account of goods (or bads)-space, summation
285 technologies, transboundary, and transgenerational aspects have been discussed in the literature
286 (Sandler 1997) but rarely in regard to GMA-related national and international law (Myerson, in A/B
287 forthcoming, is an exception). It would appear that a fruitful field of inquiry is ready for exploration in this
288 regard.

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Author Queries

Query Refs.	Details required
Q1	Please provide "abstract".
Q2	"Anderton and Carter (2014) and Shaffer (2010)" are cited in text but not given in the reference list. Please provide details in the list.
Q3	The citation "Kaul 2006" has been changed to "Kaul and Conceição 2006" as per reference list. Please check if okay.
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Q5	Please provide volume number and page range for Anderton and Carter (forthcoming), Esteban et al. (forthcoming).

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