

# The Final Round: Combating Armed Actors, Organized Crime and Wildlife Trafficking

Nikhil Acharya \ BICC  
Dr Arthur Mühlen-Schulte

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## RECOMMENDATIONS

### \ Link the problems of wildlife trafficking and small arms and light weapons proliferation

Wildlife and wildlife products constitute a high-value 'conflict resource: When trafficked together with small arms and light weapons (SALW), this resource proliferation reinforces a cycle of armed violence impeding development, eroding state institutions and threatening community security.

### \ Bridge knowledge and skill gaps by enhancing technical collaboration with wildlife authorities

Deploy technical advisors and systematically share intelligence between wildlife conservation and SALW control programmes to map, identify, trace and track networks and flows of arms, ammunition and high value wildlife trafficking (HVWT).

### \ Support joint training efforts to counter the proliferation of SALW and HVWT

Prioritize trainings on customs and border management, physical security and stockpile management (PSSM) of weapons and ammunition, record-keeping and targeted capacity-building of wildlife authorities and rangers.

### \ Enhance cross-border collaboration between wildlife authorities and SALW actors, including law enforcement authorities, Joint Border Forces and SALW experts

The illicit trade in wildlife and weapons takes place across sovereign borders and cannot be dealt with by states in isolation. Sharing intelligence, strengthening legislation and conducting joint operations at the regional level is crucial.

### \ Align regional and national Action Plans to counter HVWT

Assist member states to co-ordinate action, tailor standards and design and implement coherent strategies that explicitly recognize the relationship between eradicating HVWT, countering SALW proliferation and achieving wider development goals.

### \ Target common drivers of HVWT and weapons proliferation

Poverty, conflict, weak governance and high demand are key drivers of both HVWT and SALW proliferation. Participatory solutions, including education, advocacy and livelihood creation, are key to eradicating demand and nurturing development in order to eliminate the trade.

# The Final Round: Combating Armed Actors, Organized Crime and Wildlife Trafficking

High value wildlife trafficking (HVWT) refers to the illegal killing (poaching) and trade in wildlife and related products in contravention of national or international law. As the pressure on African wildlife rises, the conflict between increased mobilization of paramilitary forces seeking to gain from the trade as well as militarized responses by those trying to protect and conserve the environment is escalating, resulting in an increasing human death toll on both sides. HVWT is no longer a by-product of conflict but is actively sustaining and fuelling regional destabilization. Transnational criminal syndicates and several non-state armed groups are seeking to profit from this and expand their operations by trading wildlife for weapons, fuelling a cycle of violence that has an impact on local communities, erodes the rule of law and threatens national security. Framing the endangered keystone species within the 'conflict resources' framework/ paradigm thus recognizing the need for protecting them as high value natural resources (HVNR), recognizes the protection of biodiversity as integral to state stability.

Until recently, HVWT has mainly been considered an ecological problem for conservationists to resolve. This *policy brief* seeks to counter this misconception by drawing attention to existing overlaps in skill sets, training and objectives of communities of practice, targeting-wildlife trafficking and/or controlling SALW, currently working independently towards the same goal: A reduction in armed violence. While poachers use a variety of means to kill animals, the majority is killed by illicit firearms and ammunition. In light of the proven role of armed actors in HVWT, linking both communities of practice is critical for containing this militarized threat.

This *policy brief* aims to equip SALW policymakers and practitioners with an understanding of how increased wide-scale wildlife trafficking is directly linked to the involvement of organized crime, heavily armed state and non-state actors and the proliferation of small arms, light weapons and ammunition, creating a volatile mix that threatens cross-border destabilization and causes insecurity. The *brief* argues that the SALW control community of practice, including donors, policymakers, practitioners and national authorities, should

closely collaborate with the conservation community, underlining potential areas of co-operation. Further, it offers recommendations on how regional and sub-regional organizations can play an instrumental role in facilitating the prevention of wildlife trafficking.

## The weapons, wildlife and warlords nexus: Saving the elephant in the room

The rise in the death toll of endangered animals is unprecedented: In Africa, over 30,000 elephants are being killed every year, and 1,215 rhinos were killed in 2015 alone, threatening wild populations of both animals with extinction within a decade. Losing keystone species that balance our common ecosystem will have drastic economic and ecological consequences for both human and animal populations.

The value of this trade is estimated at US \$15 to 23 billion annually (UNEP, 2014), the fourth largest global illicit market after human trafficking, arms trafficking and illicit drugs. Poaching of wildlife, particularly elephant ivory and rhino horn, has transformed from a localized criminal enterprise into a transnational security issue with ties to organized crime. Wildlife trafficking has risen exponentially because of a steep increase in scale caused by non-state armed groups sustained by profits from illegal flows of arms and ammunition. While further investigation is required (RUSI, 2015), undeniable evidence exists that ivory and rhino horn increasingly serve as the primary purchasing currency for weapons, ammunition and supplies by both regular and irregular forces.<sup>1</sup>

This interdependent trade relationship means that the illegal trade in SALW and illicit wildlife products often uses the same/ similar routes facilitated by a similar network of actors that operate across porous sovereign borders. Wildlife reserves are also increasingly becoming a nexus for organized crime

1 \ Regular forces proven to be involved in HVWT include FARDC (DR Congo), SAF (Sudan), SPLA (South Sudan) and UPDF (Uganda). Non-state armed groups including the Lord's Resistance Army and Seleka in the Central African Republic; Mai Mai, M23, FDLR-FOCA in the DR Congo and pro-government militia such as Sudanese janjaweed and several smaller armed gangs operating in Chad.

operations, weapons trafficking and shelter for non-state armed groups. It is no longer possible to separate arms proliferation from poaching and to investigate each issue in isolation. Given the interlinkages between illegal arms proliferation, the role of armed groups and wildlife trafficking, most attempts to control or investigate each issue in isolation are insufficient. Instead, conservation and SALW communities need to adopt an integrated approach combining efforts to combat weapons and wildlife trafficking by organized criminal syndicates and armed state and non-state actors.

#### **Aggressive militarization of poaching and conservation**

In the last decade, poachers have become increasingly organized, mechanized and militarized, representing a significantly different threat. They are extremely well trained with formidable bush skills and use military-style assault rifles, silenced high-calibre hunting rifles, shotguns, craft weapons as well as traditional methods such as snares, clubs and even poison-tipped spears and arrows. Poaching gangs increasingly have access to sophisticated technologies including surveillance gear, night vision goggles, high-frequency radios, satellite phones, GPS technology and even to drones.

Rangers responding to this threat are often sorely under-equipped with obsolete weapons and are inexperienced when confronting heavily armed and tactically skilled poachers. Poaching is often backed by organized criminal networks or increasingly conducted by members of state and non-state armed groups, equipped with resources, training and firepower that enables them to bribe or force their way into protected locations. The involvement of senior government and military officials has often also provided gangs with impunity from persecution. The ineffective legal systems and the low risk of sentencing even if they were convicted fuel this sense of impunity.

Tailored military responses are necessary but must be carefully regulated to counter the unprecedented threat now posed by armed state and non-state actors as well as organized criminal networks. The

militarization and organization of poaching has resulted in the fact that several conservation sites and park authorities have adopted similar strategies to respond to this intensified threat. Privately funded paramilitary rangers are now being trained by special operations forces in South Africa and several other African range states in response to the escalation of poaching, and state forces have also been deployed in conservation areas. Some rangers are now better armed, equipped and trained and have access to better technology but the majority are still under-funded and under-resourced. Aggressive poaching and counter-poaching approaches and the increased proliferation of weapons and armed actors has resulted in pitched battles, escalating human casualties, both armed and civilian, further eroding security levels.

In Botswana, South Africa, Swaziland, Tanzania and Uganda, rangers have been authorized with a zero-tolerance 'shoot to kill' policy for poachers, and poachers have adopted a 'shoot first' policy towards rangers when threatened. Local civilian community members are increasingly affected by this spiralling cycle of violence and are sometimes caught in the crossfire where they are mistaken as poachers. Allegations also exist of oppression, theft, torture and even rape of local community members by rangers and security forces such as in Operation Tokomeza (Destroy) in Tanzania (SAS 2015, p.26, Duffy, ND). Incidents such as these indicate the need for careful regulation of military involvement and the adoption of security sector reform (SSR) approaches to build better relations between rangers and community members.

Some advocates consider the adoption of military-style counter-poaching tactics as the only viable solution, especially in contexts where legal enforcement is weak and where increasingly well-organized, armed and trained poachers present an extreme threat to the very survival of several protected species. Critics point out that militarized responses could increase violence in the long run and further alienate surrounding communities.

Beyond advocating either militarized or non-militarized approaches, tailoring responses to very different poaching environments<sup>2</sup> with carefully regulated military responses on a case by case basis, driven by inclusive, community-based approaches is the only effective, sustainable option.

### **How can the SALW community help counter wildlife trafficking?**

In order to counter increasingly dense links between militarization of poaching and illicit weapons, regional and sub-regional organizations such as the African Union, ECOWAS and RECSA provide useful platforms for engaging HVWT under the umbrella of their current mandates to counter SALW trafficking and proliferation. They are uniquely placed to create opportunities for knowledge-sharing and co-operation between communities of practice addressing HVWT and those seeking to regulate the proliferation of illicit weapons at the regional level. In co-operation with national authorities, regional organizations can co-ordinate action, tailor standards and ensure that countering HVWT is prioritized on regional and national strategic agendas.

Regional organizations working with the SALW community of practice will help counter wildlife trafficking in the following, mutually beneficial, ways: Through technical collaboration; joint training efforts; cross-border inter-agency co-operation; and by aligning regional and national action strategies.

#### **Bridging the knowledge gap: Enhancing technical co-operation**

In SALW and HVWT investigations, essential 'need to know' information is often missing, undermining the ability to design and implement effective programming to reduce insecurity at the regional, national and community levels. There is a critical need

<sup>2</sup> \ Poaching operations in different areas employ different tactics and require a high degree of organization. Variations in geography, human density, transportation infrastructure as well as the strength of governance and the capacities of wildlife authorities and rangers help determine the nature of poaching (C4ADS, 2014).

to bridge this knowledge gap, generate better quality information to enable sound decision-making and progressively move towards an evidence-based approach. Working collaboratively to share data, gather intelligence and pool information sources is critical.

There remains a dearth of crucial information, despite recent studies that compared open source data with available information from poaching kill sites and analysed the HVWT supply chain from source to market (C4ADS, 2014). This gap should be addressed by conducting baseline studies, security needs assessments and impact assessments on a regular basis and through innovative, knowledge-sharing partnerships. Existing data from projects such as UNEP's Monitoring the Illicit Killing of Elephants (MIKE), Proportional Illicit Killing of Elephants (PIKE) database and TRAFFIC/CITES' Elephant Trade Information System (ETIS) database or the Rhino DNA Indexing System (RhODIS) will be much more useful if combined with inputs from specialists such as law enforcement personnel, criminologists, anthropologists, conflict data mapping data specialists or technical experts on small arms and light weapons and then analysed through data management platforms.

Deployed technical advisors should systematically share intelligence between wildlife conservation and SALW control programmes to map, identify, trace and track networks and flows of arms, ammunition and wildlife trafficking. SALW experts should co-operate with wildlife authorities and criminologists to examine poaching kill sites and collect valuable forensic and ballistic data such as DNA samples and shell casings, which is not currently being done systematically (SAS, 2015). This should provide valuable assistance in mapping trends and flows, identifying networks, tracing and tracking illicit arms, ammunition and illicit wildlife products from source to market. This exercise will also serve to cross-check and verify alternate sources of data regarding the presence, origin and proliferation of these weapons and ammunition.

### **Containing weapons proliferation and wildlife trafficking through joint training initiatives**

Together, INTERPOL and UNODC have trained rangers in Tanzania on gathering evidence and wildlife crime scene management that increased the conviction rate of poachers. Trainings on customs and border management are to be prioritized as are physical security and stockpile management (PSSM) of weapons and ammunition; weapons marking, registration and record-keeping, and targeted capacity-building of wildlife authorities and rangers, as part of the broader security sector reform (SSR) framework. Where these SALW control initiatives are more effective, less illicit weapons are available to poachers inhibiting actions, such as police forces loaning weapons to different groups of poachers (as evidenced in Kenya and other countries). SALW control initiatives to prevent the diversion of illicit weapons or leakage from government stockpiles would positively benefit HVWT countering initiatives.

Trainings should also be used to strengthen legislation on both SALW control and wildlife crime. Existing SALW legislation on illicit weapons possession should be more vigorously implemented to support prosecutors in the conviction of arrested poachers, enabling authorities to impose more severe fines and jail terms.

### **Inter-agency co-operation by SALW actors to tackle HVWT**

The illicit trade in wildlife and weapons takes place across sovereign borders and cannot be dealt with by states in isolation. Sharing intelligence, strengthening legislation and conducting joint operations at the regional level is crucial. Border areas serve as key points of intersection between markets and other trading posts. It is therefore logical that countering HVWT should be part of the mandate of Joint Border Forces, such as the Sudan-Chad Joint Border Forces who are already working together to control illicit SALW.

Organizations with a SALW control mandate, such as RECSA, have begun to strengthen inter-agency co-operation<sup>3</sup> by signing an agreement in 2015 with the Lusaka Task Force (LATF), Interpol's agency dedicated to countering HVWT in all its aspects through capacity-building, law enforcement and developing innovative partnerships. The LATF maintains a Nairobi office at the Kenya Wildlife Services headquarters as well as national bureaus in the Congo, Lesotho, Liberia, Tanzania, Uganda and Zambia.

Regional initiatives such as these facilitate co-operation between law enforcement agencies including customs, migration, airport and port authorities across borders. Joint task forces bringing together representatives from different agencies have also proven to be more resistant to corruption. INTERPOL's Project Wisdom follows such an approach. Since 2008, it has co-ordinated seven operations<sup>4</sup> targeting ivory and rhino horn poachers, which collectively led to the arrest of 1,180 persons<sup>5</sup>, the shutting down of two ivory factories, five tons of raw ivory and assorted wildlife products as well as illegal military firearms including Kalashnikovs, Heckler and Koch G3 and Colt M16 pattern assault rifles.

### **Align SALW regional strategies and national action plans to counter HVWT**

Member states need assistance in co-ordinating action, tailoring standards to limited resource environments and in designing and implementing coherent strategies that explicitly recognize the relationship between regulating HVWT, countering SALW proliferation and achieving wider development goals. Ensuring monitoring and evaluation provisions would increase

3 \ In 2016 RECSA co-ordinated a study on the nexus between poaching, arms flows, state fragility in eight different African range states. The study also investigated how HVWT is sustaining non-state armed groups..

4 \ Operations Baba, Costa, Mogatle, Ahmed, Worthy, Wendi and Wildcat. Operation Wildcat involved wildlife enforcement officers, forest authorities, park rangers, police and customs officers from five countries working together to seize 240 kilogrammes of ivory and making 660 arrests (UNEP, 2014).

5 \ In the 2014 arrest of the ivory ringleader Faizal Mohamed, INTERPOL co-ordinated his arrest in Dar e Salaam, his extradition to Kenya and his sentencing and trial in a Mombasa court.

chances of achieving their mutual goal: Increased security and a reduction of armed violence. Poverty, conflict, weak governance and high demand are the main drivers of both HVWT and weapons proliferation. Co-ordinated regional and national planning would help leverage common funding opportunities providing much-needed resources, maximizing the impact of donor funds in areas affected by both SALW proliferation and militarized HVWT. Principles adopted in the Declaration of the 2014 London Conference on the Illegal Wildlife Trade, the 2014 Arusha Declaration on Regional Conservation and Combating Wildlife / Environmental Crime and the Cotonou Declaration can help guide regional and national strategies to counter wildlife trafficking.

### **Tackling the drivers of wildlife trafficking and weapons proliferation: Key information for policymakers and practitioners**

Diagnosing and designing responses to SALW and wildlife trafficking requires an understanding of root causes of the problem and how they determine the economics of this high-value, illicit trade. Community driven, deeply local responses need to remain central to effective response strategies.

#### **When the buying stops, the killing will too:**

##### **Understanding economics of demand**

The economics of supply and demand underpinning poaching are determined by markets mainly in Asia. Without a substantial reduction in the demand for ivory and rhino horn, anti-poaching efforts may disrupt the illicit trade, but not stop it (SAS 2015, p. 1). Eradicating demand is therefore crucial. New initiatives including high-profile media campaigns, embargoes on transporting ivory and the public destruction of illicit ivory are achieving limited success in making the ivory trade socially unacceptable.

Century-old traditions remain, and middle classes in China, the Philippines, Vietnam and Thailand continue to gain more spending power—facts that present a great challenge to these efforts. In China, prices start

at US \$2,500 for one kilogramme of ivory and range up to US \$65,000 per kilogramme for rhino horn, making users pay more, per gram, than for gold, platinum or high-grade cocaine. Criminal organizations recruit poor community members and finance their attempts to enter wildlife reserves and seek elephant ivory or rhino horn in return for payment (US \$24 to 120 in the bush, US \$325 to 400 in central African urban centres for an ivory tusk) (C4ADS, 2014). The amount of money paid for obtaining the ivory, while substantial for the poachers, is a mere fraction of the profit made by the organized criminal networks.

#### **Poverty as a central driver of poaching:**

##### **Understanding the supply side**

While it is a highly lucrative business internationally, HVWT is driven by pervasive poverty locally. Many communities surrounding wildlife largely lack alternative economic opportunities to make a livelihood. Given the high prices that ivory, rhino horn and other valuable wildlife products can fetch, the temptation to engage in poaching is high. Despite the inherent hazards involved, the potential monetary benefits and an immediate way out of poverty are perceived as far outweighing the risk. As long as the demand for these products remains high, criminal networks will have no trouble recruiting new poachers. For every poacher killed or arrested, another is ready to step in—and another family loses a breadwinner, driving the family and the wider community even further into poverty.

For an effective solution to this conflict, communities need to benefit from sustainable, well-managed use of wildlife resources. Communities need to be sensitized to the importance of wildlife as an ecological and economic resource, ensuring inclusive, sustainable tourism models that do not alienate local populations. Successful initiatives have taken place only where this relationship is actively recognized, building upon a community-based natural resource management approach. Organizations like Big Life Foundation, the Northern Rangelands Trust and its Tusk initiative operating in Kenya, The Communal Areas Management Programme for Indigenous Resources

(Campfire) initiative in Zimbabwe in the 1980s and a number of other community-based conservancies are pioneering such efforts through reducing human-animal conflict, building ownership across ethnic fault lines by providing education and viable livelihoods as well as sharing profits in a more equitable manner with dependent communities. Greater efforts along similar lines are required to better diagnose, understand and prioritize the needs of surrounding communities to avoid blueprint approaches.

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## BIBLIOGRAPHY AND FURTHER READING

- Carlsson, K., Wright, J. & Donges, H. (2015). In the Line of Fire: Elephant and Rhino Poaching in Africa. In Small Arms Survey (Ed.), *Summary Annual Report* (pp. 6-7). Retrieved from <http://www.smallarmssurvey.org/file-admin/docs/A-Yearbook/2015/eng/Small-Arms-Survey-2015-Chapter-01-summary-EN.pdf>
- Canby, P. (2015, 11 May). Letter from Central Africa: Elephant Watch. *The New Yorker*. Retrieved from <http://www.newyorker.com/magazine/letter-from-central-africa>
- Christy, B., & Stirton, B. (2015). How Killing Elephants Finances Terror in Africa. *National Geographic*. Retrieved from <http://www.nationalgeographic.com/tracking-ivory/article.html>
- CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora. (2013). *African Rhinoceroses: Latest Trends in Rhino Numbers and Poaching*. COP16 Inf. 51. Geneva: CITES Standing Committee
- CITES - Convention on International Trade in Endangered Species of Wild Fauna and Flora. (2014). *Elephant Conservation, Illegal Killing and Ivory Trade*. SC65 Doc. 42.1. Geneva: CITES Standing Committee.
- Cotonou Declaration. Sixth Meeting of the African Elephant Coalition, Cotonou, Benin (4 November 2015). Retrieved from [http://www.stopivory.org/wp-content/uploads/20151105\\_African-Elephant-Coalition-Cotonou-Declaration.pdf](http://www.stopivory.org/wp-content/uploads/20151105_African-Elephant-Coalition-Cotonou-Declaration.pdf)
- Douglas, L. R., & Kelvin, A. (2014). Perspective 'High-value natural resources: Linking wildlife conservation to international conflict, insecurity, and development concerns'. *Biological Conservation*, 171, 270-277. Retrieved from <http://www.sciencedirect.com/science/article/pii/S0006320714000391>
- Duffy, R. (2014). Waging a War to Save Biodiversity: The Rise of Militarized Conservation. *International Affairs*, 90(4), 819-834.
- Duffy, R., & St. John, F. (2013, June). *Poverty, Poaching and Trafficking: What Are the Links?* (Evidence on Demand Report). doi: [http://dx.doi.org/10.12774/eod\\_hd059.jun2013.duffy](http://dx.doi.org/10.12774/eod_hd059.jun2013.duffy)
- Gettleman, J. (2012a, 3 September). Elephants Dying in Epic Frenzy as Ivory Fuels Wars and Profits. *New York Times*. Retrieved from [http://www.nytimes.com/2012/09/04/world/africa/africas-elephants-are-being-slaughtered-in-poaching-frenzy.html?pagewanted=all&\\_r=3&](http://www.nytimes.com/2012/09/04/world/africa/africas-elephants-are-being-slaughtered-in-poaching-frenzy.html?pagewanted=all&_r=3&)
- Gettleman, J. (2012b, 31 December). Notorious Poacher Now Leads a Fight to Save Africa's Elephant. *Sydney Morning Herald*. Retrieved from <http://www.smh.com.au/world/notorious-poacher-now-leads-a-fight-to-save-africas-elephants-20121230-2c1ix.html>
- Greiner, C. (2012). *Unexpected Consequences: Wildlife Conservation and Territorial Conflict in Northern Kenya*. Springer Science and Business Media. doi 10.1007/s10745-012-9491-6
- Lawson, K., & Vines, A. (2014) *Global Impacts of the Illegal Wildlife Trade: The Costs of Crime, Insecurity and Institutional Erosion*. London: Chatham House. Retrieved from <https://www.chathamhouse.org/sites/files/chathamhouse/public/Research/Africa/0214Wildlife.pdf>
- London Conference on the Illegal Wildlife Trade Declaration. (2014). Retrieved from [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/281289/london-wildlife-conference-declaration-140213.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/281289/london-wildlife-conference-declaration-140213.pdf)
- Maguire, T., & Haenlin, C. (2015, September). *An Illusion of Complicity Terrorism and the Illegal Ivory Trade in East Africa* (Occasional Paper). London: Royal United Services Institute (RUSI). Retrieved from [https://rusi.org/sites/default/files/201509\\_an\\_illusion\\_of\\_complicity\\_0.pdf](https://rusi.org/sites/default/files/201509_an_illusion_of_complicity_0.pdf)
- Nellemann, C., Henriksen, R., Raxter, P., Ash, N., & Mrema, E. (Eds). (2014). *The Environmental Crime Crisis - Threats to Sustainable Development from Illegal Exploitation and Trade in Wildlife and Forest Resources*. (A UNEP Rapid Response Assessment). Nairobi: United Nations Environment Programme. Retrieved from <http://www.unep.org/uneal/docs/RRac-rimecrisis.pdf>
- Stiles, D. (2011). *Elephant Meat Trade in Central Africa: Summary Report*. Gland, Switzerland: International Union for Conservation of Nature. Retrieved from <https://portals.iucn.org/library/efiles/documents/ssc-op-045.pdf>
- United Republic of Tanzania. (2014). *Arusha Declaration on Regional Conservation and Combating Wildlife / Environmental Crime*. Retrieved from [http://www.parliament.na/phocadownload/media/2016/arusha\\_declaration.pdf](http://www.parliament.na/phocadownload/media/2016/arusha_declaration.pdf)
- Vira, V., & Ewing, T. (2014). *Ivory's Curse: The Militarization and Professionalization of Poaching in Africa*. Washington, DC: Born Free USA and C4ADS. April. Retrieved from <http://www.all-creatures.org/articles/ar-Ivorys-Curse-2014.pdf>
- Vira, V., Ewing, T., & Miller, J. (2014). *Out of Africa: Mapping the Global Trade in Illicit Elephant Ivory*. Hong Kong: Born Free USA and C4ADS. August. Retrieved from <http://www.wwf.se/source.php/1578610/out%20of%20africa.pdf>

bicc \  
Internationales Konversionszentrum Bonn  
Bonn International Center for Conversion GmbH

Pfarrer-Byns-Straße 1, 53121 Bonn, Germany  
+49 (0)228 911 96-0, Fax -22, bicc@bicc.de

www.bicc.de  
www.facebook.com/bicc.de

**bicc** Bonn  
International Center  
for Conversion \

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Director for Research  
Professor Dr Conrad Schetter

Director for Administration  
Michael Dedek

AUTHORS

**Nikhil Acharya**  
Technical Advisor at BICC

**Dr Arthur Mühlen-Schulte**

EDITOR

Susanne Heinke

COPYEDITOR / LAYOUT

Heike Webb

PUBLICATION DATE

1 June 2016

EDITORIAL DESIGN

Diesseits - Kommunikationsdesign, Düsseldorf

Member of the



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